MOTOROLA

CARRIER SQUELCH

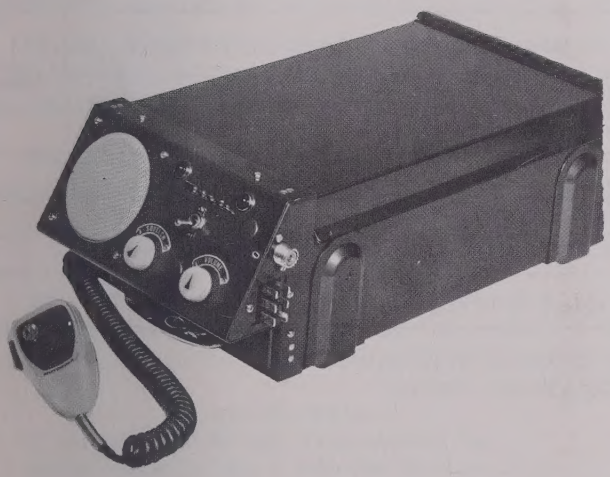
MOBILE

FM TWO-WAY RADIO

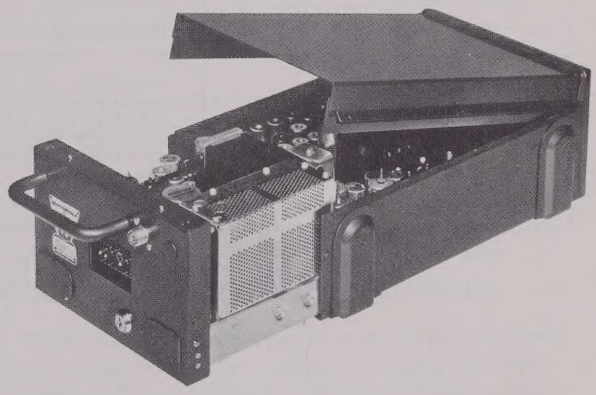
25 W RF POWER

144-174 MC 6/12 VDC

AEPD-2008(MC1788) MC1794



DASH MOUNT MODEL



TRUNK MOUNT MODEL

INTRODUCTION

The basic radio set consists of a transmitter, receiver and power supply assembled as a drawer unit which slides into a housing. In dash-mount installations the control head plugs into a receptacle on the front of the radio set. In trunk-mount installations the control mounts on the vehicle dash and a cable kit makes the connections between the control head and the basic radio set.

Installation and operating instructions are packed with the radio set accessories.

MOTOROLA INC. COMMUNICATIONS DIVISION

Engineering Publications 4501 W. Augusta Blvd. Chicago 51, Illinois

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11/12/62-RS

68P81005A15
Issue - A

GUARANTEED PERFORMANCE SPECIFICATIONS

MODEL	T43GGV and D43GGV Series
FREQUENCY	144-174 mc
RF POWER OUTPUT	25 watts
TRANSMITTER MODULATION	40F3: ±15 kc for 100% at 1000 cycles 20F3: ± 5 kc for 100% at 1000 cycles
SELECTIVITY	-100 db at ±18 kc (30 kc channel spacing) -100 db at ±32 kc (60 kc channel spacing)
MODULATION ACCEPTANCE	± 5 kc at -6 db (30 kc channel spacing) ±15 kc at -6 db (60 kc channel spacing)
20 DB QUIETING SENSITIVITY	Less than 0.6 microvolt; 50 ohms r-f input impedance
METERING	Chassis mounted metering sockets on the transmitter and receiver facilitate convenient metering of all circuits essential to tuning and checking. A Motorola Portable test set or a 0-50 microampere meter may be used for this purpose.
POWER INPUT	Standby: 11.0 amps at 6.3 v d-c or 6.0 amps at 12.6 v d-c
	Transmit: 28.0 amps at 6.3 v d-c or 15.0 amps at 12.6 v d-c
	Intermittent Drain; each crystal heater: 1.0 amp
DIMENSIONS	6" high x 9-7/8" wide x 18-1/4" long overall

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE
FCC LICENSE DESIGNATION: CC3012

FOREWORD

NOMENCLATURE

Motorola mobile radio equipment is packaged as a radio set plus accessories. The radio set is specifically identified by the model number on the nameplate.

NOTE

Be sure to use the entire model number when making inquiries about your equipment.

The accessories are identified by an accessory group number which includes the other items essential to completing the radio installation such as; antenna, cables, etc. Use this number when referring to a specific group of accessories.

Identifiers have been assigned to chassis and kits. Use these identifiers when requesting information or ordering replacements.

Radio set and accessory groups charts are located in the front of this manual.

PRODUCTION CHANGES

When production and engineering changes are incorporated into the equipment, a revision numeral is assigned to the chassis or kit affected.

Typical Example:

A Model TTD1090AA Transmitter becomes TTD1090AA-1 with the first revision.

This chassis number complete with revision numeral, if any, is stamped on the chassis at the time of production. The revision numeral becomes an integral part of the chassis identifier.

A schematic diagram number complete with its issue letter is also stamped on each chassis. This establishes direct correlation between the chassis and its schematic. The schematic issue is advanced each time a change occurs in the chassis.

INSTRUCTION MANUAL REVISIONS

Changes which occur after an instruction manual is printed are described in the Instruction Manual Revisions. These bulletins give the reader complete information on the change including pertinent parts listing data.

NATIONAL SERVICE ORGANIZATION

Motorola provides a nation-wide service organization. Through its maintenance and installation program Motorola makes available the finest service to those desiring reliable continuous communications on a contract basis.

The largest service organization specializing in mobile communications is Motorola's National Service Organization. Over 800 strategically located, adequately staffed and trained, independently owned and operated stations, manned with several thousand FCC licensed personnel constitute the sub-contracting force.

The administrative forces of area and district service managers and district service representatives are in the direct employ of Motorola.

For your contract service requirements, please contact your local Motorola representative or write to:

National Service Manager
Motorola Communications Division
4501 W. Augusta Blvd., Chicago 51, Illinois

REPLACEMENT PARTS ORDERING

Motorola maintains parts and service depots and authorized service stations strategically located through the country. These facilities are fully equipped to give the finest service.

When ordering replacement parts, the complete number identification of the item must be used whether it be a component, kit or complete chassis. This will fix proper identification and insure receipt of the desired item. Complete number identification should also be used when requesting equipment information.

Crystal orders should specify crystal type number, crystal frequency, carrier frequency and the chassis model number in which the crystal is to be used.

Orders for "Vibrasender" and "Vibrasponder" units should specify the type number and frequency and should identify the owner and operator of the communications system in which these items are to be used.

68P81009A99-B

CAREFUL USE OF THE INSTRUCTION MANUAL AND THE MANY INSTRUCTIONS CONTAINED IN IT WILL FURTHER INSURE PROPERLY INSTALLED AND MAINTAINED RADIO EQUIPMENT.

THE EQUIPMENT DESCRIBED IN THIS MANUAL IS MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING MOTOROLA U. S. PATENTS:

RE-24,110	2,602,842	2,738,466	2,809,236	2,918,571
RE-24,815	2,608,648	2,740,891	2,810,068	2,924,705
2,404,359	2,608,649	2,743,144	2,830,200	2,925,562
2,439,408	2,626,384	2,743,361	2,833,994	2,938,082
2,439,412	2,637,782	2,750,451	2,834,879	2,963,577
2,472,021	2,650,333	2,759,052	2,835,794	2,966,585
2,524,300	2,662,942	2,759,103	2,852,730	2,968,739
2,524,534	2,688,059	2,770,721	2,860,239	2,974,221
2,547,023	2,691,094	2,777,950	2,883,521	2,984,740
2,547,025	2,691,560	2,784,263	2,888,652	2,994,844
2,547,027	2,699,425	2,799,001	2,899,547	3,009,115
2,566,759	2,705,281	2,799,010	2,901,601	3,014,127
2,583,032	2,731,555	2,808,507	2,912,573	

Other U. S. Patents Pending

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RECEIVER	68P81003A84
Schematic Diagram and Parts List (Dual Squelch)	63E854758
Schematic Diagram and Parts List (Carrier Squelch Single-Frequency)	63E862494
Schematic Diagram and Parts List (Carrier Squelch Two-Frequency)	63E862493
POWER SUPPLY, MODEL TU117	68P81008A71
POWER SUPPLY, MODEL TU117-F	68P81008A72
REDUCTION OF INTERFERING NOISES IN MOBILE OPERATION	68P81001A82
Typical Noise Reduction Detail	69B81100A58

MOTOROLA

MODEL CHART
CARRIER SQUELCH MOBILE
FM TWO-WAY RADIO SETS

144-174 MC 6/12 VDC

CODE:

[X] = ONE ITEM INCLUDED

[2] = TWO ITEMS INCLUDED

[/] = ONE ITEM INCLUDED WITH FIVE (OR LESS) RADIO SETS

*REPRESENTS A SERIES OF MODELS AND NOT A SPECIFIC MODEL. THE SPECIFIC MODEL, AS STAMPED ON THE CHASSIS IS DETERMINED BY ITS APPLICATION.

MODEL	NO. OF RCVR. FREQ.	NO. OF XMTR. FREQ.	CHAN. SPACING	ACCESSORY GROUP
DASH MOUNT MODELS				
D43GGV1001BM	1	1	60 KC	BK1000 SERIES
D43GGV1101BM	1	1	30 KC	BK1000 SERIES
D43GGV1001BQ	1	1	60 KC	BK1000 SERIES
D43GGV1101BQ	1	1	30 KC	BK1000 SERIES
D43GGV1031BM	2	2	60 KC	BK
D43GGV1131BM	2	2	30 KC	BK
D43GGV1011BM	1	2	60 KC	BK
D43GGV1111BM	1	2	30 KC	BK
TRUNK MOUNT MODELS				
T43GGV1001A	1	1	60 KC	EA1000 SERIES
T43GGV1101A	1	1	30 KC	EA1000 SERIES
T43GGV1011A	1	2	60 KC	EA1000 SERIES
T43GGV1111A	1	2	30 KC	EA1000 SERIES
T43GGV1031A	2	2	60 KC	EA1000 SERIES
T43GGV1131A	2	2	30 KC	EA1000 SERIES

ITEM	DESCRIPTION	REFERENCE DIAGRAM
TTD1000AA	TRANSMITTER, 1-FREQ.	63E856736
TTD1000AB	TRANSMITTER, 2-FREQ.	63E856736
*TRD1150AA/TA140BW	RECEIVER, 1-FREQ, 60 KC CHAN. SPACING	63E862494
*TRD1150AC/TA140BW-R2	RECEIVER, 2-FREQ. 60 KC CHAN. SPACING	63E862493
*TRD1150AB/TA140BS	RECEIVER, 1-FREQ. 30 KC CHAN. SPACING	63E862494
*TRD1150AD/TA140BS-R2	RECEIVER, 2-FREQ. 30 KC CHAN. SPACING	63E862493
TU117	POWER SUPPLY, 6/12 V DC	63E831716
TU117-F	POWER SUPPLY, 6/12 V DC, DASH MOUNT	63E835298
TU206	CONTROL PANEL, 1-FREQ. MIC. CONNECTOR AND SPEAKER	63E862103
TU206-C2	CONTROL PANEL, 2-FREQ. MIC. CONNECTOR AND SPEAKER	63E862103
TU238	CONTROL PANEL, 1-FREQ. "QUIK-CALL" AND MIC. CON. & SPKR.	63E836073
TU353A	DYNAMIC MIC.	
TK163	SUB-PANEL AND INTERCABLING KIT	
TK364	FRONT PANEL	
K-9045	HOUSING	
RN1	CRYSTAL, TRANSMITTER CONTROL	
RM10	CRYSTAL, RECEIVER CONTROL	
G03	CRYSTAL RECEIVER IF	
K-9322	ALIGNMENT TOOL KIT*	

MODEL	TTD1000AA	TTD1000AB	*TRD1150AA/TA140BW	*TRD1150AC/TA140BW-R2	*TRD1150AB/TA140BS	*TRD1150AD/TA140BS-R2	TU117	TU117-F	TU206	TU206-C2	TU238	TU353A	TK163	TK364	K-9045	RN1	RM10	G03	K-9322
D43GGV1001BM	X		X						X	X			X	X	X	X	X	X	/
D43GGV1101BM	X				X				X	X			X	X	X	X	X	X	/
D43GGV1001BQ	X		X						X			X	X	X	X	X	X	X	/
D43GGV1101BQ	X				X				X		X	X	X	X	X	X	X	X	/
D43GGV1031BM		X		X				X		X			X	X	X	2	2	X	/
D43GGV1131BM		X				X	X		X				X	X	X	2	2	X	/
D43GGV1011BM		X	X						X	X			X	X	X	2	X	X	/
D43GGV1111BM		X			X				X	X			X	X	X	2	X	X	/
T43GGV1001A	X		X					X					X	X	X	X	X	X	/
T43GGV1101A	X				X			X					X	X	X	X	X	X	/
T43GGV1011A		X	X					X					X	X	X	2	X	X	/
T43GGV1111A		X			X			X					X	X	X	2	X	X	/
T43GGV1031A		X		X				X					X	X	X	2	2	X	/
T43GGV1131A		X					X	X					X	X	X	2	2	X	/

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ACCESSORY GROUP CHART

CODE:

[X] = ITEMS INCLUDED IN ACCESSORY GROUP

[O] = INCLUDED ITEM DEPENDENT ON FREQUENCY

GROUP NUMBER	TYPE OF INSTALLATION	NO. OF FREQS.	CONTROL HEAD	MICRO-PHONE	SPEAKER
EA1000A	6V TRUNK-MOUNT	1	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
EA1005A	6V TRUNK-MOUNT	1	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM
EA1006A	6V TRUNK-MOUNT	1	FOR PLUG-IN MIC.	LESS MIC.	POWER VOICE
EA1007A	6V TRUNK-MOUNT	1	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM
EA1010A	6V TRUNK-MOUNT	2	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
EA1015A	6V TRUNK-MOUNT	2	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM
EA1016A	6V TRUNK-MOUNT	2	FOR PLUG-IN MIC.	LESS MIC.	POWER VOICE
EA1017A	6V TRUNK-MOUNT	2	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM
EA1100C	12V TRUNK-MOUNT	1	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
EA1105B	12V TRUNK-MOUNT	1	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM
EA1106B	12V TRUNK-MOUNT	1	FOR PLUG-IN MIC.	LESS MIC.	POWER VOICE
EA1107B	12V TRUNK-MOUNT	1	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM
EA1110C	12V TRUNK-MOUNT	2	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM
EA1115B	12V TRUNK-MOUNT	2	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM
EA1116B	12V TRUNK-MOUNT	2	FOR PLUG-IN MIC.	LESS MIC.	POWER VOICE
EA1117A	12V TRUNK-MOUNT	2	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM
BK1000A	6V DASH-MOUNT	—	———	———	———
BK1007A	6V DASH-MOUNT	—	———	———	———
BK1100A	12V DASH-MOUNT	—	———	———	———
BK1107A	12V DASH-MOUNT	—	———	———	———

ITEM	DESCRIPTION	REFERENCE DIAGRAM
TCN6001AA	CONTROL HEAD WITH "WIRED-IN" MICROPHONE (1-FREQ.)	63E839323
TCN6001AB	CONTROL HEAD WITH "WIRED-IN" MICROPHONE (2-FREQ.)	63E839323
TCN6001AE	CONTROL HEAD WITH RECEPTACLE FOR "PLUG-IN" MIC. (1-FREQ.)	63E839323
TCN6001AF	CONTROL HEAD WITH RECEPTACLE FOR "PLUG-IN" MIC. (2-FREQ.)	63E839323
TKN6004A	CABLE KIT (6 VOLT) FOR TRUNK-MOUNT MODELS	63E839323
TKN6006A	CABLE KIT (12 VOLT) FOR TRUNK-MOUNT MODELS	63E839323
TU324A	3 OHM PM SPEAKER	63E839323
TU433A-6V	6 VOLT POWER VOICE SPEAKER	
TU433A-12V	12 VOLT POWER VOICE SPEAKER	
TLN6000A	INSTALLATION KIT	63E839323
TU316-L	ANTENNA (144-152 MC)	
TU316-M	ANTENNA (152-162 MC)	
TU316-H	ANTENNA (162-174 MC)	63E836073
TK1190	CABLE KIT (6 VOLT) FOR DASH-MOUNT MODELS	63E836073
TK1191	CABLE KIT (12 VOLT) FOR DASH-MOUNT MODELS	
TLN6001A	MOUNTING KIT (FOR DASH-MOUNT MODELS)	

GROUP NUMBER	TCN6001AA	TCN6001AB	TCN6001AE	TCN6001AF	TKN6004A	TKN6006A	TU324A	TU433A-6V	TU433A-12V	TLN6000A	TU316-L	TU316-M	TU316-H	TK1190	TK1191	TLN6001A
EA1000A	X				X		X			X	O	O	O			
EA1005A			X		X		X			X	O	O	O			
EA1006A			X		X			X		X	O	O	O			
EA1007A			X		X		X			X						
EA1010A		X			X		X			X	O	O	O			
EA1015A				X	X		X			X	O	O	O			
EA1016A				X	X			X		X	O	O	O			
EA1017A				X	X		X			X						
EA1100C	X					X	X			X	O	O	O			
EA1105B			X			X	X			X	O	O	O			
EA1106B			X			X			X	X	O	O	O			
EA1107B			X			X	X			X						
EA1110C		X				X	X			X	O	O	O			
EA1115B				X		X	X			X	O	O	O			
EA1116B				X		X			X	X	O	O	O			
EA1117A				X		X	X			X						
BK1000A										X	O	O	O	X		X
BK1007A										X				X		X
BK1100A										X	O	O	O		X	X
BK1107A										X					X	X

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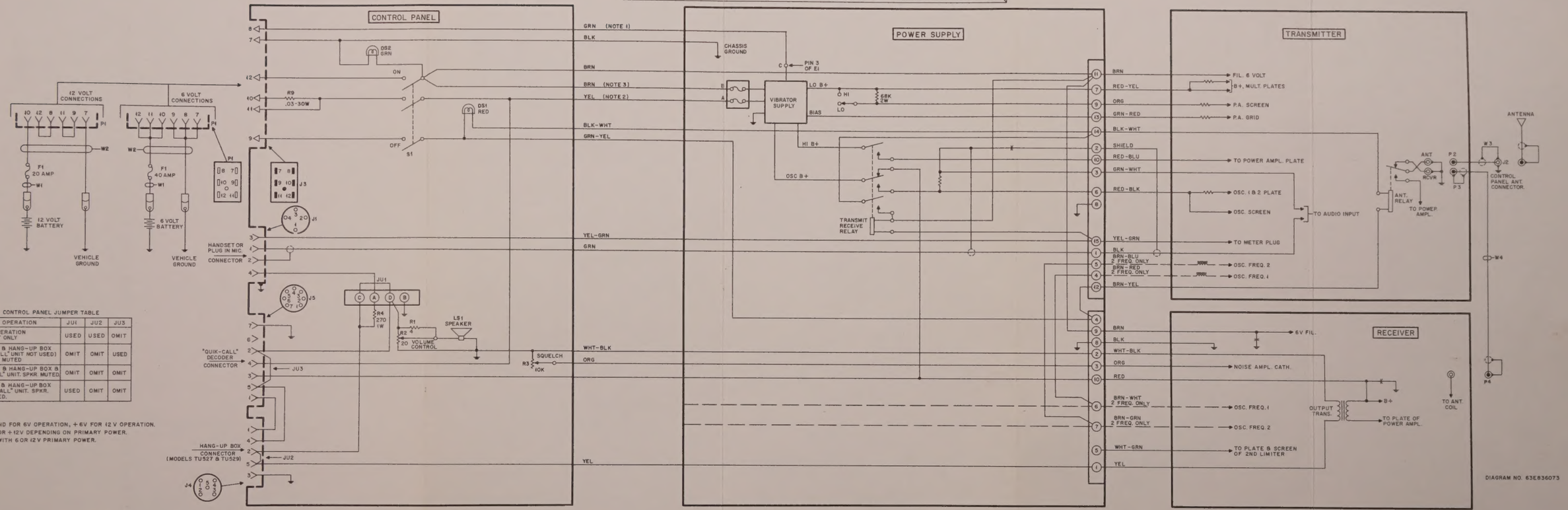
REFER TO THE INDIVIDUAL SCHEMATICS FOR COMPLETE DETAILS OF EACH CHASSIS



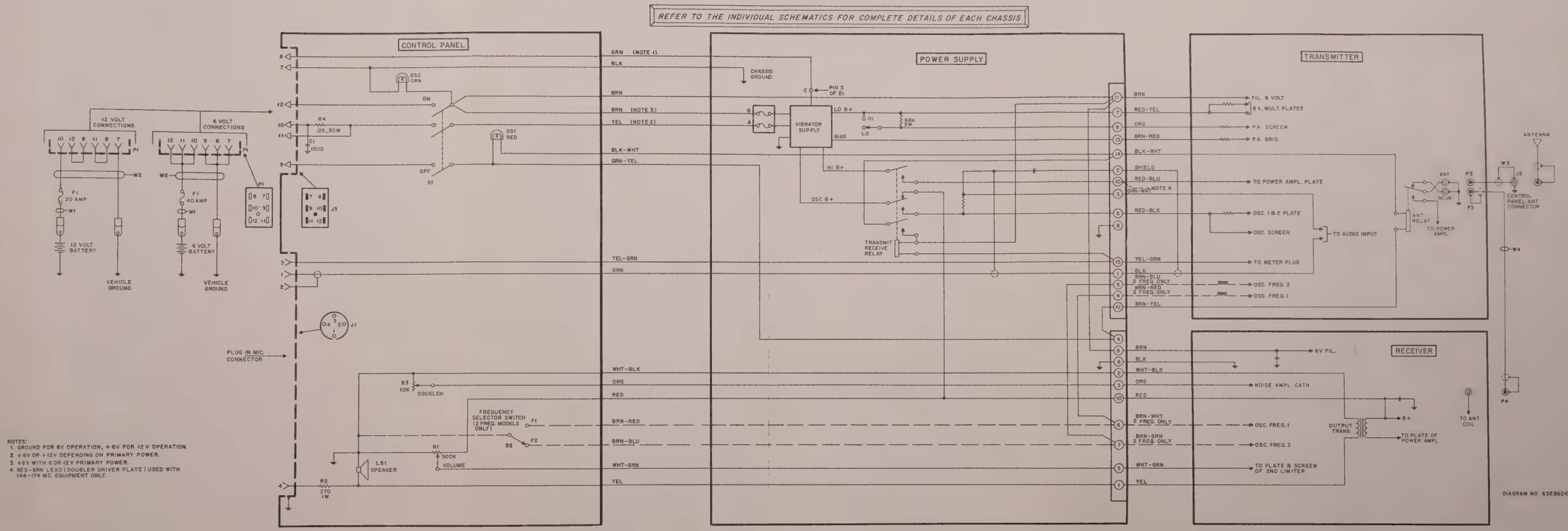
CONTROL PANEL JUMPER TABLE

CIRCUIT OPERATION	JU1	JU2	JU3
BASIC OPERATION (HANDSET ONLY	USED	USED	OMIT
HANDSET & HANG-UP BOX ("QUIK-CALL" UNIT NOT USED) SPEAKER MUTED	OMIT	OMIT	USED
HANDSET & HANG-UP BOX & "QUIK-CALL" UNIT. SPKR MUTED	OMIT	OMIT	OMIT
HANDSET & HANG-UP BOX & "QUIK-CALL" UNIT. SPKR. NOT MUTED.	USED	OMIT	OMIT

NOTES:
1. GROUND FOR 6V OPERATION, +6V FOR 12 V OPERATION.
2. +6V OR +12V DEPENDING ON PRIMARY POWER.
3. +6V WITH 6 OR 12 V PRIMARY POWER.

DIAGRAM NO. 63E836073

Dash Mount Mobile Radio Sets
With Speaker Pad Type Volume Control
And Provisions for "Quik-Call" Application
Intercabling Diagram
Motorola No. 63E836073-G
11/12/62-RS



NOTES:
1. GROUND FOR 6V OPERATION, + 6V FOR 12 V OPERATION.
2. + 6V OR + 12V DEPENDING ON PRIMARY POWER.
3. + 6V WITH 6 OR 12 V PRIMARY POWER.
4. RED-GRN LEAD (DOUBLER DRIVER PLATE) USED WITH 144-174 MC. EQUIPMENT ONLY.

DIAGRAM NO 63E862103

Dash Mount Mobile Radio Sets
With DC Type Volume Control
Intercabling Diagram
Motorola No. 63E862103-E
11/12/62-RS

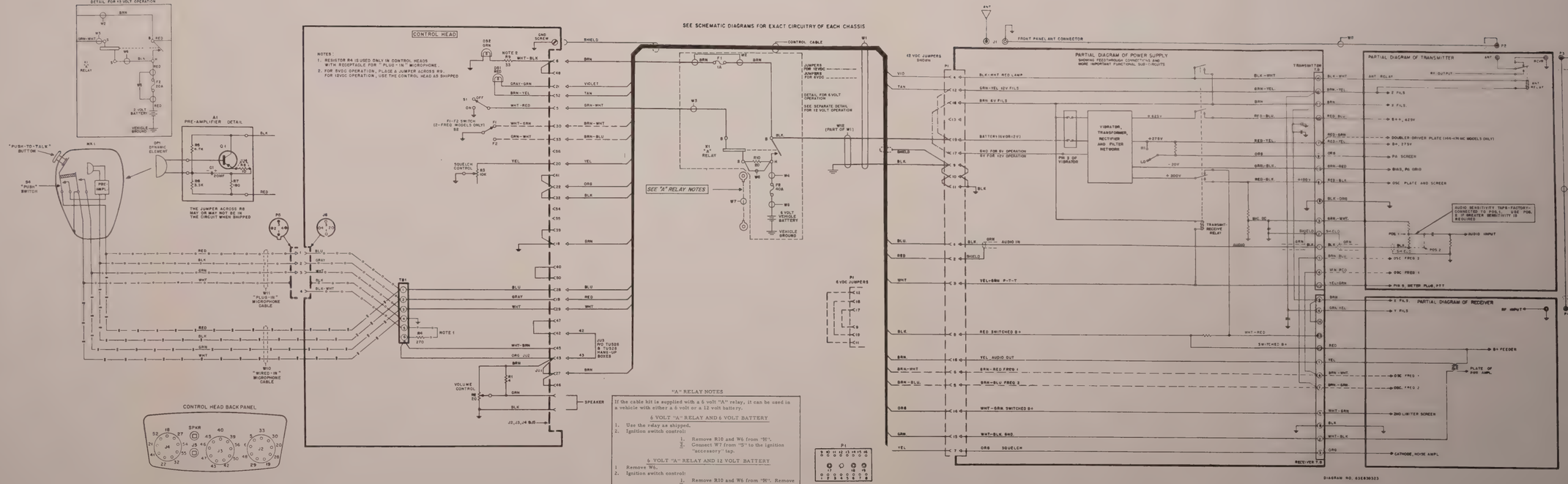
CONTROL HEAD JUMPER TABLE

CASE NO.	EQUIPMENT USED* MIC	HANDSET	HANG-UP BOX	SPEAKER (7021)	CIRCUIT OPERATION	JUMPERS JU1	JU2	JU3
1	EITHER	---	---	---	Basic operation. Radio Set Speaker in circuit at all times.	USED	OMIT	OMIT
2	---	X	---	---	Handset picked up connects audio to speaker and mutes speaker. Handset picked up connects audio to handset earpiece, speaker by-passed.	OMIT	OMIT	USED
3	X	---	X	---	Audio to speaker when microphone is removed or hung up. Alarm circuit is by-passed. Call unit disabled.	OMIT	USED	OMIT
4	---	X	---	X	Audio switched from speaker to handset earpiece when handset is picked up. Alarm circuit by-passed.	OMIT	OMIT	OMIT
5	EITHER	---	X	---	Audio switched from speaker to handset earpiece when handset is picked up. Alarm circuit by-passed.	OMIT	OMIT	OMIT
6	EITHER	---	---	X	Ch-Call unit used for alarm purposes only. Audio to speaker at all times.	USED	USED	OMIT

EPD-1516-A

* X = Item used.
--- = Item not used.
** = JU1 is p/o T7525 & T7528 Hang-Up Boxes, only.

SEE SCHEMATIC DIAGRAMS FOR EXACT CIRCUITRY OF EACH CHASSIS


DETAIL FOR 12 VOLT OPERATION
CONTROL HEAD
PRE-AMPLIFIER DETAIL
"PUSH-TO-TALK" BUTTON
S4 "PUSH" SWITCH
MK1
DPI DYNAMIC ELEMENT
PRE-AMPL
THE JUMPER ACROSS R8 MAY OR MAY NOT BE IN THE CIRCUIT WHEN SHIPPED
P5
J6
"PLUG-IN" MICROPHONE CABLE
W11
"WIRED-IN" MICROPHONE CABLE
W10
TB1
NOTE 1
CONTROL HEAD BACK PANEL
NOTES:
1. RESISTOR R4 IS USED ONLY IN CONTROL HEADS WITH RECEPTACLE FOR "PLUG-IN" MICROPHONE.
2. FOR 6VDC OPERATION, PLACE A JUMPER ACROSS R9. FOR 12VDC OPERATION, USE THE CONTROL HEAD AS SHIPPED
SQUELCH CONTROL
VOLUME CONTROL
SPEAKER
CONTROL CABLE
JUMPERS FOR 12 VDC JUMPERS FOR 6VDC
DETAIL FOR 6 VOLT OPERATION
SEE SEPARATE DETAIL FOR 12 VOLT OPERATION
W8 (PART OF W1)
X1 "A" RELAY
SEE "A" RELAY NOTES
6 VOLT VEHICLE BATTERY
VEHICLE GROUND
6 VDC JUMPERS
AUX PO TUBES & T7525 HANG-UP BOXES
12 VDC JUMPERS SHOWN
FRONT PANEL ANT CONNECTOR
PARTIAL DIAGRAM OF POWER SUPPLY
SHOWING FEEDTHROUGH CONNECTIONS AND MORE IMPORTANT FUNCTIONAL SUB-CIRCUITS
VIBRATOR, TRANSFORMER, RECTIFIER AND FILTER NETWORK
TRANSMIT-RECEIVE RELAY
PARTIAL DIAGRAM OF TRANSMITTER
PARTIAL DIAGRAM OF RECEIVER
AUDIO SENSITIVITY TAPE-FACTORY-ADJUSTED TO 4700 OHMS. USE FOR 0.3 UV SENSITIVITY IS REQUIRED
DIAGRAM NO. 63E836323

"A" RELAY NOTES

If the cable kit is supplied with a 6 volt "A" relay, it can be used in a vehicle with either a 6 volt or a 12 volt battery.

6 VOLT "A" RELAY AND 6 VOLT BATTERY

1. Use the relay as shipped.
2. Ignition switch control:
   1. Remove R10 and W6 from "H".
   2. Connect W7 from "S" to the ignition "accessory" tap.

6 VOLT "A" RELAY AND 12 VOLT BATTERY

1. Remove W6.
2. Ignition switch control:
   1. Remove R10 and W6 from "H". Remove W6 from "S" and discard.
   2. Connect one end of W7 to the loose end of R10 and insulate. Connect the other end to the ignition "accessory" tap.

If the cable kit is supplied with a 12 volt "A" relay, it can only be used in a vehicle with a 12 volt battery.

12 VOLT "A" RELAY AND 12 VOLT BATTERY

1. Use the relay as shipped.
2. Ignition switch control:
   1. Remove W6.
   2. Connect W7 from "S" to the ignition "accessory" tap.

EPD-1893-A

Trunk Mount Mobile Radio Set
Intercabling Diagram
Motorola No. 63E839323-M
11/12/62-RS

TRANSMITTER

1. MODEL TABLE

MODEL NUMBER	APPLICATION	NUMBER OF FREQUENCIES
TTD1000AA	Carrier Squelch	1
TTD1000AB	Carrier Squelch	2
TTD1000AC	Dual Squelch	1
TTD1000AD	Dual Squelch	2

2. PERFORMANCE SPECIFICATIONS

RF POWER OUTPUT	25 watts
CRYSTAL MULTIPLICATION	Twenty-four (24) times
SPURIOUS AND HARMONIC EMISSION	All spurious and harmonic emissions are attenuated at least 60 db below carrier level.
FREQUENCY STABILITY AND TEMPERATURE RANGE	Oven type crystal unit maintains carrier within ±. 0005 percent of assigned center frequency from -30°C to +60°C ambient (+25°C reference).
MODULATION	40F3: ±15 kc for 100 percent at 1000 cps 20F3: ±5 kc for 100 percent at 1000 cps
AUDIO SENSITIVITY	Factory connection: 0.165 volt at ±3 db for 2/3 maximum deviation at 1000 cps. Optional connection: 0.120 volt at ±3 db for 2/3 maximum deviation at 1000 cps.
PLATE VOLTAGE REQUIREMENTS	25 Watts r-f output 395 v d-c at 150 ma 270 v d-c at 105 ma 150 v d-c at 10 ma -20 v d-c bias

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

3. EXCERPTS FROM FCC REGULATIONS

a. Radio transmitters may be tuned or adjusted only by persons holding a 1st or 2nd class radiotelephone license or by personnel working directly under their immediate supervision.
b. The r-f power output of a station shall be no more than required for satisfactory technical operation considering the area to be covered and the local conditions.

4. TEST EQUIPMENT REQUIRED

a. Motorola Models S1056A-9A or TU546 Test Set (or equivalent)
b. Motorola K-9322 Alignment Tool Kit
c. Motorola T1130A Series FM Station Monitor (or equivalent)
d. RF wattmeter
e. Power Supply (preferably the one designed for the transmitter under test)

5. HOW TO SET UP THE EQUIPMENT

a. Connect one end of the metering cable to the test set and the other end to the transmitter METER receptacle.
b. Place the Function Selector Switch in the XMTR. position.
c. Place the oscillator and meter reversing switch in the OFF position.
d. Connect the power supply to the transmitter as shown on the radio set intercabling diagram.
e. Turn the equipment on. Allow at least a 30-second warm-up period before keying the transmitter.
f. Connect the r-f wattmeter to the transmitter ANT. jack.
g. Place the HI-LO switch on the transmitter in the LO position.

6. HOW TO KEY THE TRANSMITTER

a. Use the XMTR-ON switch of the test set to place the unmodulated carrier on the air for meter reading and adjustment.
b. Use a microphone to key and modulate the transmitter as required.

CAUTION

Do not key the transmitter for more than a few seconds at a time until it is properly tuned. Plate current is excessive in untuned stages and may damage the unit.

7. FREQUENCY CALCULATIONS

$f_o = \frac{f_c}{24}$ where: f_o = crystal frequency, and f_c = carrier frequency

8. HOW TO SET "IDC" CONTROL
(Transmitter Deviation)

Refer to the reverse side of this chart for "IDC" control setting procedure.

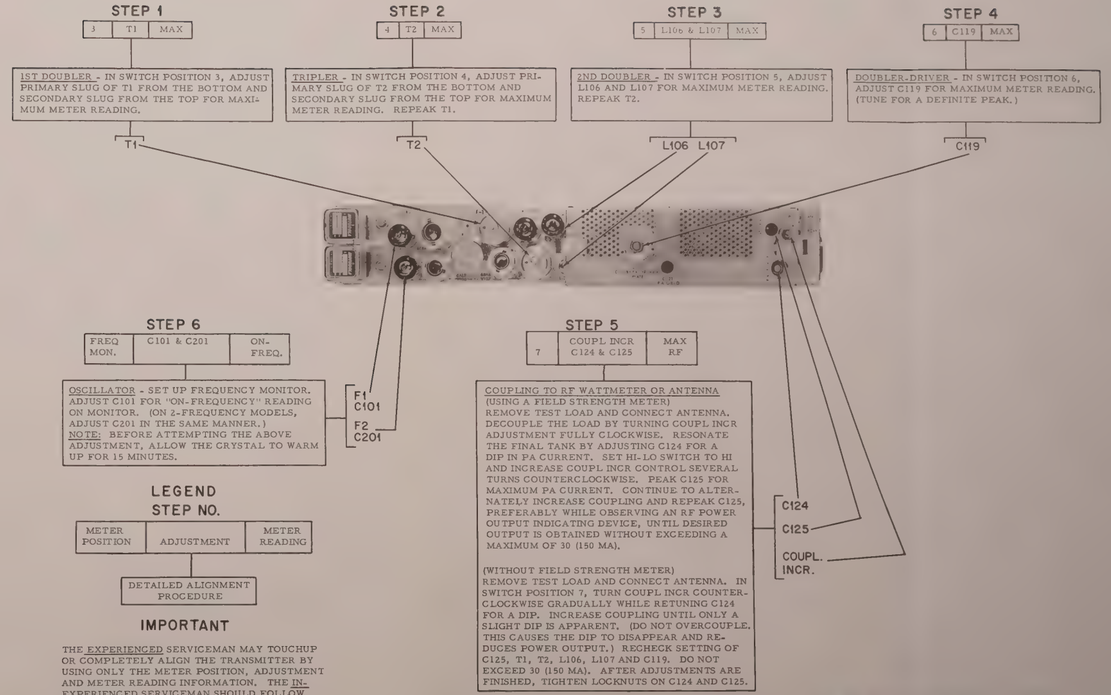
9. FINAL METER READINGS

a. Each time a transmitter is aligned or tested, final meter readings should be made and entered in a logbook.
b. All readings given in the table below are minimum except PA, which is maximum. DO NOT exceed the value given for the PA current. This is the maximum plate current to which the unit can be safely tuned.
c. Readings 1 through 6 are purely relative and do not give actual current or voltage measurement.
d. Multiply the scale reading by 5 to obtain the actual PA plate current in milliamperes.

S1056A-9A OR TU546 SERIES TEST SET METER READINGS

Switch Position		1	2	3	4	5	6	7	9	10	11	12
Meter Reading	25 W	-	-	4	6	11	9	30 max.	18 ua 400 V	30 ua 46 V	**	***
Circuit Metered		-	-	Tripler Grid	2nd Doubler Grid	Doubler Driver Grid	PA Grid	PA Plate Current	PA Plate Voltage	Push To Talk	Audio Input	Mike DC

* = 6 volts on standby. Zero volts on transmit.
** = Test set audio voltmeter reads from 0.12 volt to 0.23 volt for 2/3 rated deviation with 1000 cps sine wave modulation.
*** = Zero on standby. 4 volts on transmit.


STEP 1
3 T1 MAX
1ST DOUBLER - IN SWITCH POSITION 3, ADJUST PRIMARY SLUG OF T1 FROM THE BOTTOM AND SECONDARY SLUG FROM THE TOP FOR MAXIMUM METER READING.
T1
STEP 2
4 T2 MAX
TRIPLER - IN SWITCH POSITION 4, ADJUST PRIMARY SLUG OF T2 FROM THE BOTTOM AND SECONDARY SLUG FROM THE TOP FOR MAXIMUM METER READING. REPEAK T1.
T2
STEP 3
5 L106 & L107 MAX
2ND DOUBLER - IN SWITCH POSITION 5, ADJUST L106 AND L107 FOR MAXIMUM METER READING. REPEAK T2.
L106 L107
STEP 4
6 C119 MAX
DOUBLER-DRIVER - IN SWITCH POSITION 6, ADJUST C119 FOR MAXIMUM METER READING. (TUNE FOR A DEFINITE PEAK.)
C119
STEP 6
FREQ MON. C101 & C201 ON-FREQ.
OSCILLATOR - SET UP FREQUENCY MONITOR. ADJUST C101 FOR "ON-FREQUENCY" READING ON MONITOR. (ON 2-FREQUENCY MODELS, ADJUST C201 IN THE SAME MANNER.)
NOTE: BEFORE ATTEMPTING THE ABOVE ADJUSTMENT, ALLOW THE CRYSTAL TO WARM UP FOR 15 MINUTES.
F1 C101
F2 C201
STEP 5
7 COUPL INCR C124 & C125 MAX RF
COUPLING TO RF WATTMETER OR ANTENNA
(USING A FIELD STRENGTH METER)
REMOVE TEST LOAD AND CONNECT ANTENNA. DECOUPLE THE LOAD BY TURNING COUPL INCR ADJUSTMENT FULLY CLOCKWISE. RESONATE THE FINAL TANK BY ADJUSTING C124 FOR A DIP IN PA CURRENT. SET HI-LO SWITCH TO HI AND INCREASE COUPL INCR CONTROL SEVERAL TURNS COUNTERCLOCKWISE. PEAK C125 FOR MAXIMUM PA CURRENT. CONTINUE TO ALTERNATELY INCREASE COUPLING AND REPEAK C125, PREFERABLY WHILE OBSERVING AN RF POWER OUTPUT INDICATING DEVICE, UNTIL DESIRED OUTPUT IS OBTAINED WITHOUT EXCEEDING A MAXIMUM OF 30 (150 MA).
(WITHOUT FIELD STRENGTH METER)
REMOVE TEST LOAD AND CONNECT ANTENNA. IN SWITCH POSITION 7, TURN COUPL INCR COUNTERCLOCKWISE GRADUALLY WHILE RETUNING C124 FOR A DIP. INCREASE COUPLING UNTIL ONLY A SLIGHT DIP IS APPARENT. (DO NOT OVERCOUPLE. THIS CAUSES THE DIP TO DISAPPEAR AND REDUCES POWER OUTPUT.) RECHECK SETTING OF C125, T1, T2, L106, L107 AND C119. DO NOT EXCEED 30 (150 MA). AFTER ADJUSTMENTS ARE FINISHED, TIGHTEN LOCKNUTS ON C124 AND C125.
C124
C125
COUPL. INCR.
LEGEND
STEP NO.
METER POSITION
ADJUSTMENT
METER READING
DETAILED ALIGNMENT PROCEDURE
IMPORTANT
THE EXPERIENCED SERVICEMAN MAY TOUCHUP OR COMPLETELY ALIGN THE TRANSMITTER BY USING ONLY THE METER POSITION, ADJUSTMENT AND METER READING INFORMATION. THE INEXPERIENCED SERVICEMAN SHOULD FOLLOW THE DETAILED ALIGNMENT PROCEDURE.

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11/12/62-RS

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Issue - B

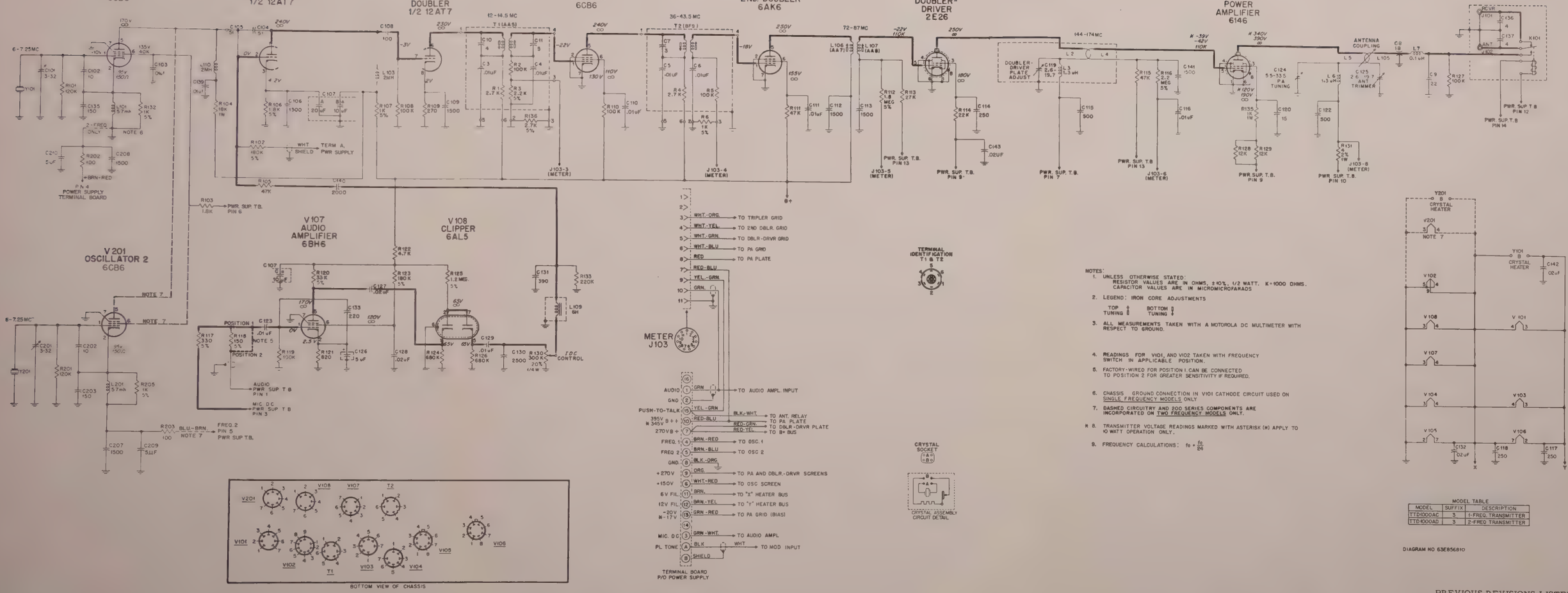
NT OF DEVIATION

f measuring transmitter deviation is to use the Motorola T1020A
ion Meter. This unit, properly used, permits the accurate measure-
deviation from peak-reading meter, which is unaffected by waveform.
d with this instrument. With this device, the transmitter deviation can
vith voice modulation.

he system still appears to be too low after setting deviation as indicated

vill insure that the transmitter will comply with FCC requirements for

rect deviation setting can not be overemphasized. Optimum system
e deviation setting, both from the standpoint that overdeviation will
adjacent channel, and underdeviation may reduce system range.



NOTES:

1. UNLESS OTHERWISE STATED: RESISTOR VALUES ARE IN OHMS, ±10%, 1/2 WATT. K=1000 OHMS. CAPACITOR VALUES ARE IN MICROMICROFARADS
2. LEGEND: IRON CORE ADJUSTMENTS
   TOP TUNING ↑ BOTTOM TUNING ↓
3. ALL MEASUREMENTS TAKEN WITH A MOTOROLA DC MULTIMETER WITH RESPECT TO GROUND.
4. READINGS FOR V101, AND V102 TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION.
5. FACTORY-WIRED FOR POSITION 1. CAN BE CONNECTED TO POSITION 2 FOR GREATER SENSITIVITY IF REQUIRED.
6. CHASSIS GROUND CONNECTION IN V101 CATHODE CIRCUIT USED ON SINGLE FREQUENCY MODELS ONLY
7. DASHED CIRCUITRY AND 200 SERIES COMPONENTS ARE INCORPORATED ON TWO FREQUENCY MODELS ONLY.
8. TRANSMITTER VOLTAGE READINGS MARKED WITH ASTERISK (*) APPLY TO 40 WATT OPERATION ONLY.
9. FREQUENCY CALCULATIONS: $fo = \frac{fc}{24}$

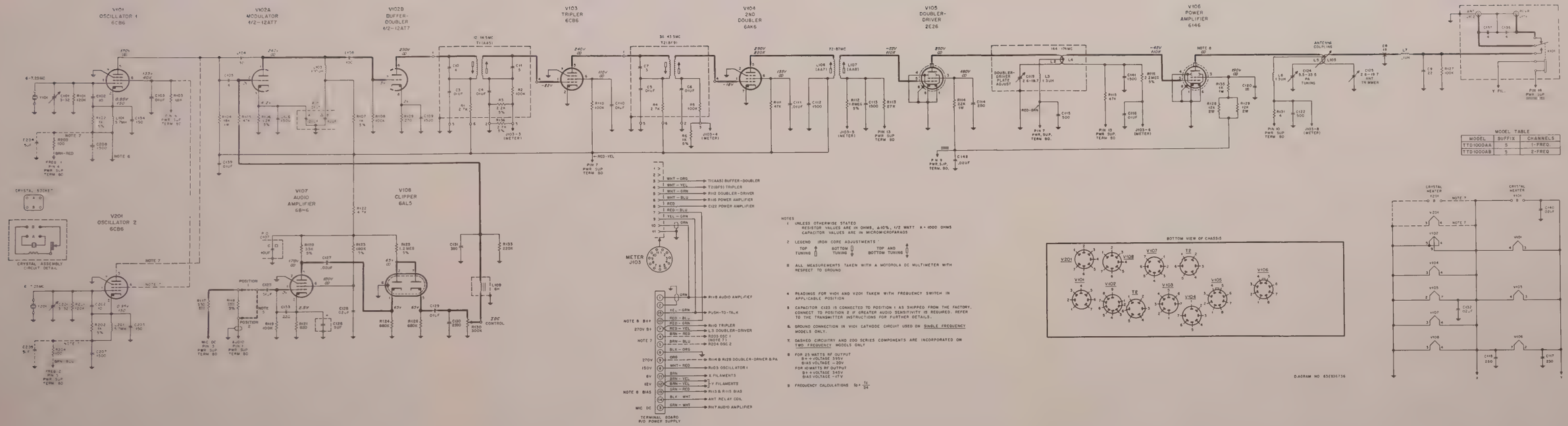
MODEL TABLE

MODEL	SUFFIX	DESCRIPTION
TTD1000AC	3	1-FREQ. TRANSMITTER
TTD1000AD	3	2-FREQ. TRANSMITTER

DIAGRAM NO 63E856810

PREVIOUS REVISIONS LISTED ON BACK OF THIS DIAGRAM →

Transmitter Schematic Diagram
Dual Squelch Applications
Motorola No. 63E856810-C
11/12/62-RS


V101 OSCILLATOR 1 6CB6
V102A MODULATOR 1/2-12AT7
V102B BUFFER-DOUBLER 1/2-12AT7
V103 TRIPLER 6CB6
V104 2ND DOUBLER 6AK6
V105 DOUBLER-DRIVER 2E26
V106 POWER AMPLIFIER 6146
V107 AUDIO AMPLIFIER 6BH6
V108 CLIPPER 6AL5
V201 OSCILLATOR 2 6CB6
CRYSTAL ASSEMBLY CIRCUIT DETAIL
METER J103
TERMINAL BOARD P/O POWER SUPPLY
ANTENNA COUPLING
Y FIL.
PWR. SUP. TERM. 80
MODEL TABLE
MODEL | SUFFIX | CHANNELS
TTD1000AA | 5 | 1-FREQ.
TTD1000AB | 5 | 2-FREQ
NOTES
1 UNLESS OTHERWISE STATED RESISTOR VALUES ARE IN OHMS, ±10%, 1/2 WATT K = 1000 OHMS CAPACITOR VALUES ARE IN MICROMICROFARADS
2 LEGEND IRON CORE ADJUSTMENTS
3 ALL MEASUREMENTS TAKEN WITH A MOTOROLA DC MULTIMETER WITH RESPECT TO GROUND
4 READINGS FOR V101 AND V201 TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION
5 CAPACITOR C123 IS CONNECTED TO POSITION 1 AS SHIPPED FROM THE FACTORY. CONNECT TO POSITION 2 IF GREATER AUDIO SENSITIVITY IS REQUIRED. REFER TO THE TRANSMITTER INSTRUCTIONS FOR FURTHER DETAILS.
6 GROUND CONNECTION IN V101 CATHODE CIRCUIT USED ON SINGLE FREQUENCY MODELS ONLY.
7 DASHED CIRCUITRY AND 200 SERIES COMPONENTS ARE INCORPORATED ON TWO FREQUENCY MODELS ONLY
8 FOR 25 WATTS RF OUTPUT B+ = VOLTAGE 395V B1&3 VOLTAGE -30V FOR 10 WATTS RF OUTPUT B+ = VOLTAGE 345V B1&3 VOLTAGE -17V
9 FREQUENCY CALCULATIONS fo = fx/24
BOTTOM VIEW OF CHASSIS
DIAGRAM NO 63E856736

PREVIOUS REVISIONS LISTED ON BACK OF THIS DIAGRAM →

Transmitter Schematic Diagram
Carrier Squelch Applications
Motorola No. 63E856736-F
11/12/62-RS

MODEL TABLE

TYPE	SPLIT CHANNEL	WIDE BAND	NO. OF FREQ.
Dual Squelch Models	TRD1150AH Series TRD1150AF Series	 TRD1150AE Series	2 1
Carrier Squelch Models	TRD1150AB Series TRD1150AD Series TRD1180AB Series	TRD1150AA Series TRD1150AC Series TRD1180AA Series	1 2 1

PERFORMANCE SPECIFICATIONS

TYPE OF CHANNEL SPACING	SPLIT	WIDE BAND
SELECTIVITY	-100 db at ±15 kc	-100 db at ±32 kc
MODULATION ACCEPTANCE	±5 kc	±15 kc
SENSITIVITY	Less than 0.50 microvolt for 20 db quieting; 50 ohms r-f input impedance	
SPURIOUS RESPONSE	Spurious and image responses are attenuated 100 db or more.	
TEMPERATURE RANGE AND FREQUENCY STABILITY	Oven type crystal maintains oscillator stability within ±.0005% of center frequency from -30°C to +60°C ambient (+25°C reference).	
SQUELCH ("PRIVATE-LINE" AND CARRIER)	1. Tone-controlled type; threshold sensitivity 0.18 microvolt. (U.S. patent applied for) 2. Carrier-actuated type; noise compensated; adjustable sensitivity; threshold sensitivity 0.18 microvolt. (U.S. Patent No. 2343115, other patents pending.)	
AUDIO OUTPUT	2.0 watts to 3 ohm load at less than 10% distortion.	
AUDIO RESPONSE	+1, -8 db of 6 db/octave de-emphasis characteristic from 300-3000 cps	
AUDIO OUTPUT	2 watts into 3.2 ohms at less than 10% distortion, except for TRD1180AA Series & TRD1180AB Series which have a 1-1/2 watt output	
AUDIO RESPONSE	De-emphasis 6 db per octave (within +1 db to -8 db) between 300 and 3000 cps, except for TRD1180AA Series & TRD1180AB Series which have an extended low frequency response.	

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

20 DB QUIETING SENSITIVITY MEASUREMENT

This procedure provides a simple but precise test of the overall sensitivity of the receiver. Perform this measurement in the following manner:

a. Set up the test set for metering applications according to "TO SET UP TEST SET FOR METERING" paragraph.

b. Warm up the signal generator for 1-1/2 to 2 hours.

c. Place the test set function selector switch in the RCVR position. Place the position selector in position 11, AUDIO.

d. Set the signal generator to the carrier frequency and connect the signal generator, using the coaxial cable and 6 db pad, to the antenna connector on the radio set. The exact carrier frequency will be indicated by a "0" reading on the "0" center scale of the test set with the position selector switch in position 4. Return the switch to position 11, AUDIO.

e. Turn the SQUELCH control on the control head fully counterclockwise (open) and set the "PL" ON-OFF switch to OFF.

f. Set the VOLUME control to provide any convenient reading on the 0-2 v a-c scale on the test set, preferably mid-scale for ease in reading.

g. If the radio set has a speaker connected to it and in operation, place the test set SPKR switch to the OPEN position. If the radio set under test does not have a speaker connected to it, place the test set SPKR switch to the LOAD position. It is important that only one speaker be in the circuit, i.e., either the speaker on the radio set or the speaker on the test set. Now note the exact meter reading and mark it down for use as a reference later.

h. Place the test set multiplier switch to the 0.2 v a-c position and hold it there. This makes the meter exactly 10 times, or 20 db, more sensitive than the normal 2 v a-c position

i. Increase the signal until the meter needle is in exactly the same position as noted in step g. The noise has been reduced 20 db. The receiver sensitivity in microvolts can now be read on the signal generator.

AVERAGE STAGE MEASUREMENTS

APPROX. MICROVOLT INPUT	INPUT TO	FREQUENCY	METER POSITION	METER READING OR DB.
150,000	Pin 1 of V107 2nd IF-2	455 KC	1	-5
2000	Pin 1 of V106 2nd IF-1	455 KC	1	-5
5000	Filter	455 KC	1	-5
5.0	Pin 1 of V104 1st IF	12.0 MC	*DB Meter	20 db (quieting)
150		12.0 MC	1	-5
3.8	Pin 6 of V103 1st Mixer	12.0 MC	*DB Meter	20 db (quieting)
30.0		12.0 MC	1	-5
2.5	Pin 1 of V101 1st RF	F_c	*DB Meter	20 db (quieting)
14.0		F_c	1	-5
6.0	Antenna	F_c	1	-5
0.5 or less	Antenna	F_c	*DB Meter	20 db (quieting)
Noise	Antenna	No Signal	1	-0.1 to -1
Noise	Antenna	No Signal	2	-18 to -40
Noise	Antenna	No Signal	4	**0
Noise	Antenna	No Signal	5	-12 to -16
Noise	Antenna	No Signal	6	-10 to -40

NOTE

A Motorola Model T1034B Signal Generator was used when taking readings on V101, V103, and V104. A Measurements Corp. Model 65B Signal Generator with a 30 ohm terminated output cable was used when taking all other readings.

*Refer to paragraph "20 DB QUIETING SENSITIVITY MEASUREMENT".
**A meter reading of up to ±7 ua is allowable without any degradation.

TEST SET SELECTOR SWITCH POSITIONS

TU546 Series Test Sets	1	2	4	5	6
Circuit Metered	2nd IF (#3) Grid	1st Lim. Grid	Discr. Output	Discr. Input	1st Osc. Grid

RECEIVER

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11/12/62-RS

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Issue - A

TEST EQUIPMENT REQUIRED

a. Motorola S1056A-9A or TU546 Series Test Set (or equivalent)
b. Motorola T1034B Signal Generator (or equivalent)

TO SET UP TEST SET FOR METERING

a. Set Function Selector Switch to RCVR position.
b. Connect 20-pin plug on the meter cable into the receptacle on the test set. Plug the other end (11-pin plug) into the receiver METER receptacle. To conserve test set battery life, either (1) disconnect meter cable from test set, or (2) place the Oscillator and Meter Reversing switch to OFF with the Position Selector switch to any position except 4, 11, or 13.

TO SET UP TEST SET FOR 455 KC OUTPUT

a. Place the Oscillator and Meter Reversing switch to the 455 KC position.
b. Connect one end of the r-f extension cable to the r-f connector on the test set. Connect the r-f probe to the other end of the extension cable. Use the r-f probe to inject the signal to the applicable receiver stages.
c. Remove the r-f probe and return the Oscillator and Meter Reversing switch to OFF when finished.

TO SET UP SIGNAL GENERATOR FOR 12 MC IF ALIGNMENT

a. If not previously done, set up test set for metering applications as described in paragraph above.
b. Couple the signal generator output loosely to the grid (pin 7) of V105 to give a small increase in meter reading with the test set selector switch in position 1 or 2.
c. Set the test set selector switch to position 4.
d. Set the signal generator frequency for approximately 12 mc.
e. Locate the exact 12 mc point by rotating the generator dial back and forth until you obtain a meter reading of exactly zero. The meter reading should go above and below zero as the dial is rotated. Leave the generator set for zero meter reading. Be sure the signal remains constant throughout the alignment (generator may drift).

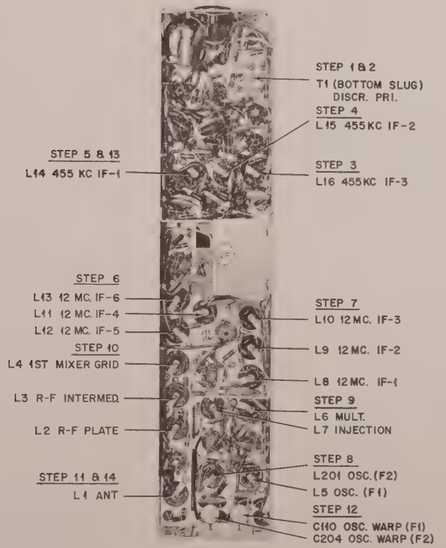
TO SET UP SIGNAL GENERATOR FOR CARRIER FREQUENCY

Follow the procedure outlined in "TO SET UP SIGNAL GENERATOR FOR 12 MC IF ALIGNMENT," paragraph, except:

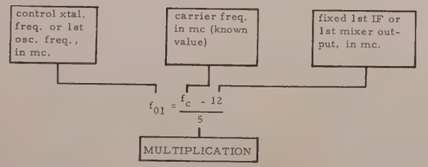
a. Select the carrier frequency, instead of 12 mc.
b. Couple the signal to pin 6 of V103 instead of pin 7, V105.

TEST SET SELECTOR SWITCH POSITIONS

S1056A-9A or TU546 Series Test Sets	1	2	4	5	6
Circuit Metered	2nd IF (#3) Grid	1st Lim. Grid	Discr. Output	Discr. Input	1st Osc. Grid



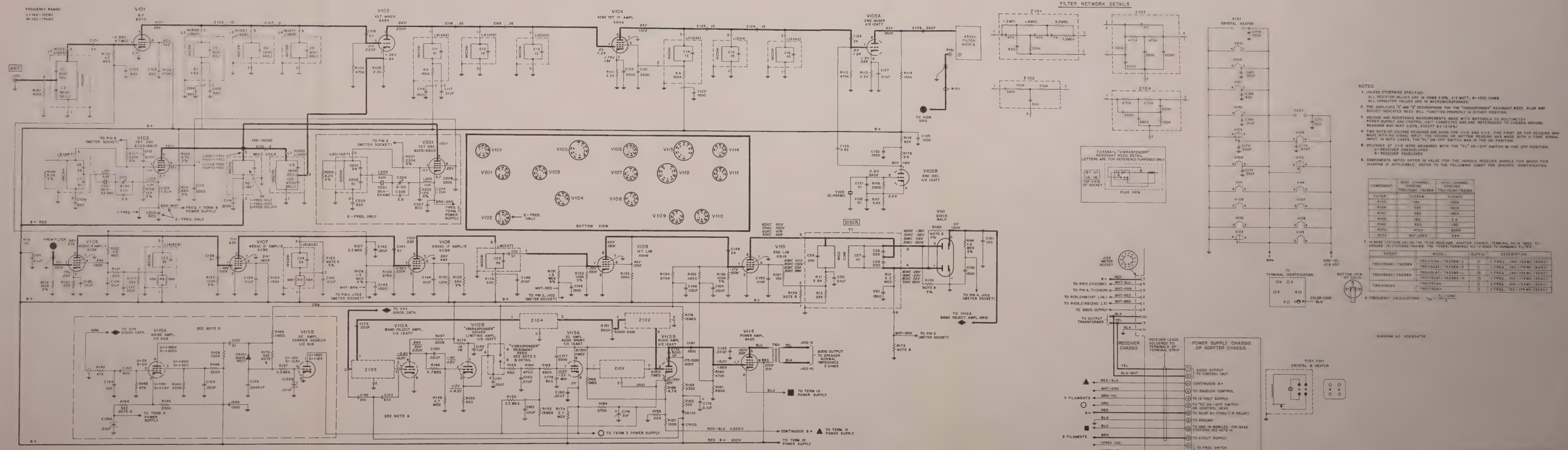
FREQUENCY CALCULATIONS


control xtal. freq. or 1st osc. freq., in mc.
carrier freq. in mc (known value)
fixed 1st IF or 1st mixer output, in mc.
$f_{01} = \frac{f_c - 12}{5}$
MULTIPLICATION

STEP	STAGE. TEST CONDITIONS AND PROCEDURE	ALIGNMENT FREQUENCY	ADJUSTMENT	S1056A-9A AND TU546 TEST SET SWITCH POSITION	METER READING
1	DISCRIMINATOR PRIMARY -- Solder a short jumper across terminals 4 and 5 of the discriminator secondary coil (see DETAIL A, lower left). Set up the Motorola Test Set as described in the left hand column. Place the test set selector switch in position 1 and set the ON-OFF switch to the ON position. Move the r-f probe around near pin 1, V106, until the meter reading is at least 15 ua. Secure the probe in its position and place the selector switch in position 5. Adjust T1 (bottom slug) for maximum meter reading. Unsolder the jumper.	455 kc sharp tuning	T1 bottom slug	5	Maximum
2	DISCRIMINATOR SECONDARY -- With the r-f probe placed as in step 1 adjust the top slug of T1 for exactly zero meter reading (selector switch in position 4)	455 kc sharp tuning	T1 top slug	4	Zero
3	455 KC, IF COIL L16 -- Place the r-f probe near the input to the 455 kc i-f filter. Couple the signal loosely so that an increase of signal strength will produce a linear increase in meter reading (switch in position 1 or 2). Secure the probe in position to keep the input at a constant level. Adjust L16 for a maximum meter reading with the switch in position 2	455 kc sharp tuning	L16	2	Maximum
4	455 KC, IF COIL L15 -- Couple the signal to the i-f filter so as to obtain a maximum reading of approximately 5 ua with the selector switch in position 1. Adjust L15 for a maximum reading.	455 kc. broad tuning	L15	1	Maximum
5	455 KC, IF COIL L14 -- Use the same conditions as in step 4. Adjust L14 for a maximum meter reading. Place the test set ON-OFF switch in the OFF position and remove the r-f probe.	455 kc, sharp tuning	L14	1	Maximum
6	12 MC, IF COILS L13, L12 and L11 -- Set up the Model T1034B Signal Generator (or equivalent) as described below the illustration. After adjusting the signal generator set the test set selector switch to position 1 or 2 and couple the generator output to the grid (pin 1) of V104. The signal must be coupled loosely so that an increase of signal produces a linear increase in meter reading (position 1 or 2). Adjust L13 for a maximum meter reading with switch in position 1 or 2, note that two peaks are present within the coil tuning range. The peak found when the slug is nearest the top of the coil is the proper alignment peak. Adjust L12 and L11 for a maximum meter reading (position 1 or 2).	12 mc, sharp tuning	L13, L12 and L11	1 or 2	Maximum
7	12 MC, IF COILS L10, L9 and L8 -- Follow the same procedure as in step 6 except couple the signal to the grid (pin 6) of V103 and adjust L10, L9 and L8; no double peaks will be found.	12 mc, sharp tuning	L10, L9 and L8	1 or 2	Maximum
8	FIRST OSCILLATOR COIL L5 -- Uncouple the signal generator. Position the ceramic trimmer, C110, so that the screwdriver adjustment slot is parallel with the length of the receiver chassis. Adjust coil L5 for a maximum meter reading with the selector switch in position 6. If 2-frequency, set F1-F2 switch on control head to F1 position while adjusting L5. Then repeat in F2 position, setting trimmer C204 (similar to setting C110) and adjusting coil L201 for maximum.	Receiver crystal frequency, sharp tuning	C110 (C204) L5 (L201)	6	Maximum
9	MULTIPLIER COILS L7 AND L6 -- The signal generator must be set for the exact carrier frequency to be received. To do this follow the procedure outlined below the illustration except select the carrier frequency instead of 12 mc and couple the signal to pin 6 of V103 instead of pin 7, V105. With the generator output coupled loosely to pin 6, V103, adjust L7 and L6 for maximum meter reading (position 1 or 2).	Carrier frequency, sharp tuning	L7 L6	1 or 2	Maximum
10	RF COILS L4, L3 and L2 -- Keep the signal generator set for the carrier frequency as in step 9. Couple the signal loosely to the grid (pin 1) of V101. Adjust L4, L3 and L2 for maximum reading (position 1 or 2).	Carrier freq., sharp tuning	L4, L3 and L2	1 or 2	Maximum
11	ANTENNA COIL L1 -- Connect the signal generator output to the antenna receptacle on the receiver chassis. Use a 6 db, 50 ohm attenuation pad between the generator and the receiver input. Adjust L1 for maximum reading.	Carrier freq. broad tuning	L1	1 or 2	Maximum
12	FREQUENCY CHECK -- Transmit the carrier frequency from the transmitter which this receiver is normally intended to receive. Be certain that the transmitter is on frequency. A zero meter reading indicates that the receiver is on frequency (selector switch in position 4). Adjust trimmer C110 to obtain a zero meter reading. Check the final setting by rotating C110 back and forth while observing the meter. The reading should go above and below the zero point as the trimmer is rotated. Set C110 for exactly zero meter reading. On 2-frequency receivers, adjust C204 for the number 2-frequency.	Carrier frequency, sharp tuning	C110 (C204)	4	Zero
13	IGNITION NOISE ADJUSTMENT (for receiver's used in mobile units only) -- Install the receiver in the vehicle. Start the vehicle engine and allow it to run while making the adjustments. Turn the receiver ON and allow it to warm up for five minutes. Radiate a carrier frequency signal from a transmitter, signal generator or test set (see test set instruction manual). The signal should be just strong enough to produce quieting (20 to 30 db). Turn VOLUME control on control head to normal usable level. Plug the test set metering cable into the METER receptacle on the receiver. Set the selector switch to position 2 and note the meter reading. Adjust coil L14 very slighly to reduce a audible ignition noise. DO NOT reduce the meter reading more than one-half microampere.	Carrier freq., slight adj.	L14	2	Reduce audible noise
14	ANTENNA COIL L1 -- Peak L1 with the receiver's transmission line and antenna connected. However, this can be accomplished only if a weak carrier signal of the proper frequency can be heard (perhaps from a distant mobile radio set).	Carrier freq., broad tuning	L1	1 or 2	Maximum

DISCRIMINATOR TRANSFORMER DETAIL

AEPD-6897-O
AEPD-2006-B (CE1225C)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS ±10%, 1/2 WATT, K=1000 OHMS.
   ALL CAPACITOR VALUES ARE IN MICROMICROFARADS.
2. THE DUPLICATE "A" AND "B" DESIGNATIONS FOR THE "VIBRASPONDER" RESONANT REED PLUG AND SOCKET INDICATES REED WILL FUNCTION PROPERLY IN EITHER POSITION.
3. VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH MOTOROLA DC MULTIMETER. POWER SUPPLY TO BE PROPERLY CONNECTED AND ARE REFERENCED TO CHASSIS GROUND. READINGS MAY VARY ±20%, EXCEPT B+ (±10%).
4. TWO SETS OF VOLTAGE READINGS ARE GIVEN FOR V112 AND V113. THE FIRST OR TOP READING WAS MADE WITH NO SIGNAL INPUT. THE SECOND OR BOTTOM READING WAS MADE WITH A TONE SIGNAL INPUT. IN BOTH CASES, THE "PL" ON-OFF SWITCH WAS IN THE ON POSITION.
5. VOLTAGES AT V115 WERE MEASURED WITH THE "PL" ON-OFF SWITCH IN THE OFF POSITION.
   U = RECEIVER UNSQUELCHED
   S = RECEIVER SQUELCHED
6. COMPONENTS NOTED DIFFER IN VALUE FOR THE VARIOUS RECEIVER MODELS FOR WHICH THIS DIAGRAM IS APPLICABLE. REFER TO THE FOLLOWING CHART FOR SPECIFIC IDENTIFICATION:

COMPONENT	60KC CHANNEL SPACING TRD1154AF, TA23BW	50KC CHANNEL SPACING TRD1154AF, TA23BS
FILTER	TU5460K	TU5405
R125	18K	100K
R139	56K	180K
R140	56K	180K
R138	18K	3.3
R166	820	180
R170	470K	820K
R173	NOT USED	22K

7. IN BASE STATIONS HAVING THE TA43, TA53 RECEIVER ADAPTER CHASSIS, TERMINAL NO 12 GOES TO GROUND IN STATIONS HAVING THE TA43, TERMINAL NO 12 GOES TO HARMONIC FILTER.

SERIES	MODEL	SUFFIX	DESCRIPTION
TRD1154AE-TA23BW	TRD1154AE-TA23BW-L	11	1 FREQ. (44-152MC (60KC)
	TRD1154AF-TA23BW-H	11	1 FREQ. 152-174MC (60KC)
TRD1154AF/TA23BS	TRD1154AF-TA23BS-L	13	1 FREQ. (44-152MC (50KC)
	TRD1152AF/TA23BS-H	13	1 FREQ. 152-174MC (50KC)
	TRD1152AH	3	2 FREQ. (44-152MC (50KC)
TRD1152AH	TRD1152AH	5	2 FREQ. 152-174 MC (50KC)

8. FREQUENCY CALCULATIONS: $F_{OSC} = \frac{F_{REC} - 10MC}{3}$

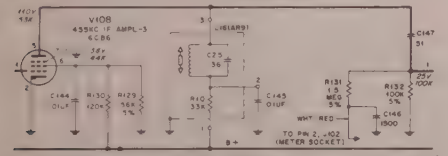
DIAGRAM NO. 63E854758

PREVIOUS REVISIONS LISTED ON BACK OF THIS DIAGRAM

Dual Squelch Receiver
Schematic Diagram
Motorola No. 63E8547587-T1
11/12/62-RS

REVISIONS

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
[illegible]	TRD1151AH-1 TRD1152AH-1		ADDED 2-FREQ. CONNECTIONS	[illegible]
[illegible]	[illegible] TRD1152AE/ TA2388W-H-8 TRD1151AF/ TA2388S-L-9 TRD1152AF/ TA2388-H-9 [illegible] RD1152AH-1		TERM. #12 DESIGNATION WAS TO GND IN MOBILES, TO HARMONIC FILTER IN BASE STATIONS	POWER S SUPPLY CHASSIS OR ADAPTER CHASSIS TERM. BD.
			MOTOROLA S1052A DC MULTIMETER WAS VTVM	NOTE 8
[illegible]	RD1151AE/ TA2388W-L-8 TRD1152AE/ A2388W-H-8 TRD1151AF/ A2388S-H-9 TRD1152AF/ A2388-H-9 TRD1151AH-1 RD1152AH-1	C180 P101 W101	WAS 8K840299 WAS 28K849416 WAS 1V857900	PARTS LIST
[illegible]	TRD1151, 2AE-9 TRD1151, 2AF-10 TRD1151, 2AH-2	C147 R10 L16 C32	REMOVED 51 uuf REMOVED 33K WAS 24K840842 (AB9) ADDED 51 uuf	IF AMPL. -3 V108-PLATE
			ADDED 33K CIRCUIT WAS AS SHOWN BELOW	



[illegible]	[illegible]	[illegible]	[illegible]	V115A NOISE AMPL.
[illegible]	[illegible]	[illegible]	WAS 680 OHMS [illegible]	
[illegible]	[illegible]		FREQUENCY DATA ADDED NOTE 8 ADDED	V102 AND V201 STAGES
[illegible]	[illegible]	[illegible]	ADDED 0.1 uf	B+ CIRCUIT (VICINITY [illegible]
[illegible]	[illegible]	[illegible]	WAS 4.2 MEC	PARTS LIST
[illegible]	[illegible]	[illegible]	WAS MEC	
[illegible]	[illegible]	[illegible]	MODEL S1052A DELETED	NOTE 8

PARTS LIST for Receiver Diagram 63E854758-T1

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITOR, fixed: uuf; 500 v; unless otherwise stated
C1L, 3L, 5L	Z1R124710	10 ±0.5 uuf
C1H, 5H	Z1K849333	6 ±0.25 uuf
C2L, 10L	Z1K863623	56 ±5%
C2H, 23, 24, 25	Z1K834092	36 ±5%
C3H	Z1R121918	6 ±0.5 uuf
C4L	Z1K836528	14 ±5%
C4H	Z1R121958	12 ±5%
C6, 201	Z1K840716	24 ±5%
C7, 32, 131, 132, 138, 141, 202	Z1K840711	51 ±5%
C8L	Z1K836528 or Z1R124710	14 ±5%; (1-Freq. Only) 10 ±.5 uuf; N330 (2-Freq. Only)
C8H	Z1R124710 or Z1K838113	10 ±.5 uuf (1-Freq. Only) 6 ±0.25 uuf (2-Freq. Only)
C9L	Z1R31492	20 ±5%
C9H	Z1R119296	16 ±5%
C10H	Z1R114207	47 ±10%
C11	Z1K838729	51 ±5%
C12, 13	Z1R114535	15 ±5%
C14, 14	Z1R122049	12 ±5%
C19	Z1K838686	10 ±5%
C20	Z1K840048	240 ±5%
C27	Z1K840811	10 ±5%
C28, 29	Z1K840812	200 ±5%
C30, 117, 127	Z1B801139	.01 uf +80-20%; 600 v
128, 135, 136, 137, 139, 14		
144, 145, 147, 148, 167, 168, 171, 172		
C31, 111, 122, 125, 130, 143, 146, 152, 158, 176, 181, 210	Z1B800801	1500 GMV +100%
C101, 103, 104, 105, 108, 126, 149	Z1K840365	24 ±5%
C102, 109, 168, 203, 207, 209	Z1B837745	820 ±10%
C106, 118, 119, 120, 124	Z1K881064	0.15 ±5%
C107	Z1K830200	0.2 ±5%
C110, 204	Z0B840719	var; 8-50
C111, 205	Z1K838284	3.9 ±.25 uuf; 250 v
C112, 113, 114, 177, 208	Z1K837746	2000 ±10%
C115	Z1K830201	.3 ±5%
C120, 121	Z1K837996	3900 ±10%
C129	Z1K475679	0.82 ±10%
C142, 148, 160, 174, 175	Z1B401029	.02 uf +80-20%; 250 v
C151, 154	Z1K840046	100 ±10%
C153, 154	Z1K840049	800 ±5%; 300 v
C155	Z1R115393	two section: c/o:
C155A		.01 uf GMV +100%
C155B		.01 uf GMV +100%
C156	8K867972	.02 uf ±10%; 200 v
C157	Z1D840044	51 ±10%
C159	8K868925	.0068 uf ±10%; 200 v
C161	Z3C82601A03 or Z3B844927	20 uf +100-10%; 25 v
C166	8K85984	.02 uf ±20%; 400 v
C174	Z3C82601A15	3 uf +150-10%; 100 v
C176	Z1R122871	5000 ±20%
C178	Z1B847070	800 ±10%; 600 v
C179, 185	8K858371	0.1 uf ±10%; 400 v
C180	8K863321	0.22 uf ±10%; 200 v
C182	Z3C82601A16	1 uf +150-10%; 250 v
C183	Z1K845214	510 ±5%; 300 v
		SEMI-CONDUCTOR DEVICE, diode: (SEE NOTE)
CR101, 102, 103	48C82420C01	silicon
		CONNECTOR, receptacle:
J101	9C87120	female; single contact
J102	9B86864	female; 11 contact; does not include 42A821428 RING, connector retainer

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		COIL, RF:
L1L	24K836515	Antenna, stamped AD4; incl: 76A824120 CORE, tuning and C1L, C2L
L1H	24B824102	Antenna; stamped 102; incl; 76A824120 CORE, tuning and C1H, C2H
L2L	24V80900A53	Plate; stamped BQ4; incl: 76A824120 CORE, tuning and C3L, R1
L2H	24V80900A54	Plate; stamped BQ5; incl; 76A824120 CORE, tuning and C3H, R1
L3L	24K836519	Coupling; stamped AD8 incl; 76A824120 CORE, tuning and C4L
L3H	24B824106	Coupling; stamped 106; incl: 76A824120 CORE, tuning and C4H
L4L	24K836520	Mixer Grid; stamped AD9; incl; 76A824120 CORE, tuning and C5L
L4H	24K824107	Mixer Grid; stamped 107; incl; 76A824120 CORE, tuning and C5H
L5	24B840709	1st Osc; stamped AR7; incl; 46K881276 CORE, tuning; ORANGE and C6, C7
L6L	24K836517	1st Osc; stamped AD6; incl; 76A824120 CORE, tuning and C8L, R2 (1-Freq. Only)
	or 24K824105	1st Mult; stamped 105; incl; 76A838181 CORE, tuning; and C8L, R2 (2-Freq. Only)
L6H	24K824105	1st Mult; stamped 105; incl; 76A838181 CORE, tuning; and C8H, R2 (1-Freq. Only)
	or 24B838987	1st Mult; stamped AP7; incl; 76A838181 CORE, tuning; and C8H, R2 (2-Freq. Only)
L7L	24K836516	Injection; stamped AD5; incl; 76A824120 CORE, tuning; and C9L, C10L
L7H	24K824103	Injection; stamped 103; incl; 76A824120 CORE, tuning; and C9H, C10H
		COIL, IF:
L8	24B834778	5.5 mc IF -1; stamped AA2; incl; 76A824118 CORE tuning; and C11, R3
L9	24B824109	5.5 mc IF -2; stamped 109; incl; 76A824118 CORE, tuning; and C12
L10	24B824110	5.5 mc IF -3; stamped 110; incl; 76A824118 CORE, tuning; C13
L11	24K834779	5.5 mc IF -4; stamped AA3; incl; 76A824118 CORE, tuning; and C14, R4
L12	24K824111	5.5 mc IF -5; stamped 111; incl; 76A824118 CORE, tuning; and C15
L13	24K824112	5.5 mc IF -6; stamped 112; incl; 76A824118 CORE, tuning; and C16
L14	24K854048	2nd IF -1; stamped BC6 incl; 46K891110 CORE, tuning; GRN and C23, R8
L15		same as L14 except 2nd IF -2 and incl; C24, R9
L16	24V80901A62	2nd IF -3; stamped CA7; incl; 46K891110 CORE, tuning; GRN and C25, C32
		COIL, RF:
L101, 202	24K868885	choke; 4 uh; WHT-BLU
L102, 203	24K861264	choke; 1 uh; RED-BLK
L103, 204	24D859162	choke; 1.2 uh; BLK-GRN
L201		same as L5; except incl; C201, C202
		CONNECTOR, plug: male;
P101	28A474006	single contact

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		RESISTOR, fixed: ±10%; 1/2 w; unl. stated
R1	6R6117	5.6K
R2	6R5591	18K
R3, 114, 124, 168	6R6398	150K
R4, 101, 133, 157	6R6031	100K
R8, 9	6R6074	68K, 2 req d
R11, 178	6R6428	6.8K
R12, 127	6R6433	2.2 meg
R13, 156	6R6397	22K
R102, 148, 149	6R6446	4.7 meg
R103, 126, 134, 154	6R6414	270K
R104, 112, 160, 164	6R6377	470K
R105, 111, 113	6R6069	2.2K
R106, 205	6R400490	8.2K ±5%
R107, 201	6R400066	220K ±5%
R108, 202	6R2075	12K ±5%
R109	6R5772	47K ±5%
R110	6R6479	68K ±5%
R115, 121	6R5644	82K
R116	6R5646	390K
R117	6R6117	5.6K
R118	6R6326	100
R119, 123, 132, 136	6R5553	100K ±5%
R120	6R6270	220
R122	6R490110	3.9 meg
R125	6R488095	18K ±5%; used only in 60 kc model
	or 6R5553	100K ±5%; used only in 30 kc model
R127	6R6433	2.2 meg
R128, 131, 141	6R400228	1.5 meg ±5%
R129	6R401006	56K ±5%
R130	6R5631	120K
R135, 155, 169	6R6046	1 meg
R137	6R6477	15K
R138	6R5591	18K; used only in 60 kc model
	or 6R5581	3.3K; used only in 30 kc model
R139, 140	6R401006	56K ±5%; used only in 60 kc model
	or 6R2061	180K ±5%; used only in 30 kc model
R142, 143	6R6048	47K
R144, 145, 146, 147	6R6407	220K
R150	6R6269	820
R151	18A86865	var; 500K ±30%; 1/4 w
R152, 176	6R476065	15 meg
R153, 167	6R6497	3.3 meg
R158	6R6080	4.7K
R159	6R2096	330K
R161, 165	6R6475	680K
R162, 177, 178	6R6410	33K
R163	6R6074	68K
R166	6R6269	820; used only in 60 kc model
	or 6R5660	180; used only in 30 kc model
R170	6R6377	470K; used only in 60 kc model
	or 6R6429	820K; used only in 30 kc model
R173	6R6480	22K ±5%; used only in 30 kc model
R174	6R488136	2.7 meg
R175	6R6327	1K; 1 w
		TRANSFORMER,
T1	1V842353	RF: Discr; coded BLUE; incl; two 76A821495 CORE, tuning; coded YELLOW and C26, C27, C28, C29 C30, C31, R11, R12, R13
T101	25C82604B01	AF: Output; 5K primary to 3.2 ohm secondary

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		ELECTRON TUBE:
V101	9ST296A01	type 6EV5
V102, 201	9ST225A01	type 6CE5/6BC5
V103	9ST232A01	type 6AB4
V104, 109	9ST175A01	type 6BH6
V105, 112	9ST113A02	type 12AT7
V106, 107, 108	9ST147A03	type 6CB6
V110	9ST176A01	type 6BJ6
V111	9ST111A03	type 6AL5
V113	9ST134A01	type 12AX7
V114	9ST101A01	type 6AQ5
V115	9ST150A03	type 6U8
		LINE, RF transmission:
W101	1V80711A92	assy; incl: 30B849414 CABLE, RF; coaxial; RG-58A/U; 4-1/4" lgth; incl; ref. P101
		SOCKET, tube:
XV101, 102, 201	9B834083	female; 7 contact; min
XV103, 104,	9K87124	female, 7 contact; min
XV105	9B881243	female, 9 contact; min
XV106, 107	9K849460	female, 7 contact; min
XV108, 109, 110, 111, 114	9B87123	female, 7 contact; min
XV112, 113, 115	9B86868	female; 9 contact; min.
		SOCKET, crystal
XY101, 201	9K857508	female; 4 contact
XY102	9K861367	female; 2 contact
		CAPACITOR-RESISTOR ASSEMBLY
		Printed Circuit:
Z101	51C82906B01	filter network; consisting of resistances and capacitances combined in one unit; with 3 bare wire terminal leads
Z102	51C82908B01	filter network; consisting of resistances and capacitances combined in one unit; with 3 bare wire terminal leads
Z103	51C82907B01	filter network; consisting of resistances and capacitances combined in one unit; with 4 bare wire terminal leads
Z104	51C82909B01	filter network; consisting of resistances and capacitances combined in one unit, with 3 bare wire terminal leads
NON-REFERENCED ITEM		
	9C82050A01	SOCKET, "Vibrasponder": female; 4 contact

FILTER

	TU540W	IF FILTER: "Permakay" IF Filter; used only in 60 kc model
	or TU540S	"Permakay" IF Filter; used only in 30 kc model

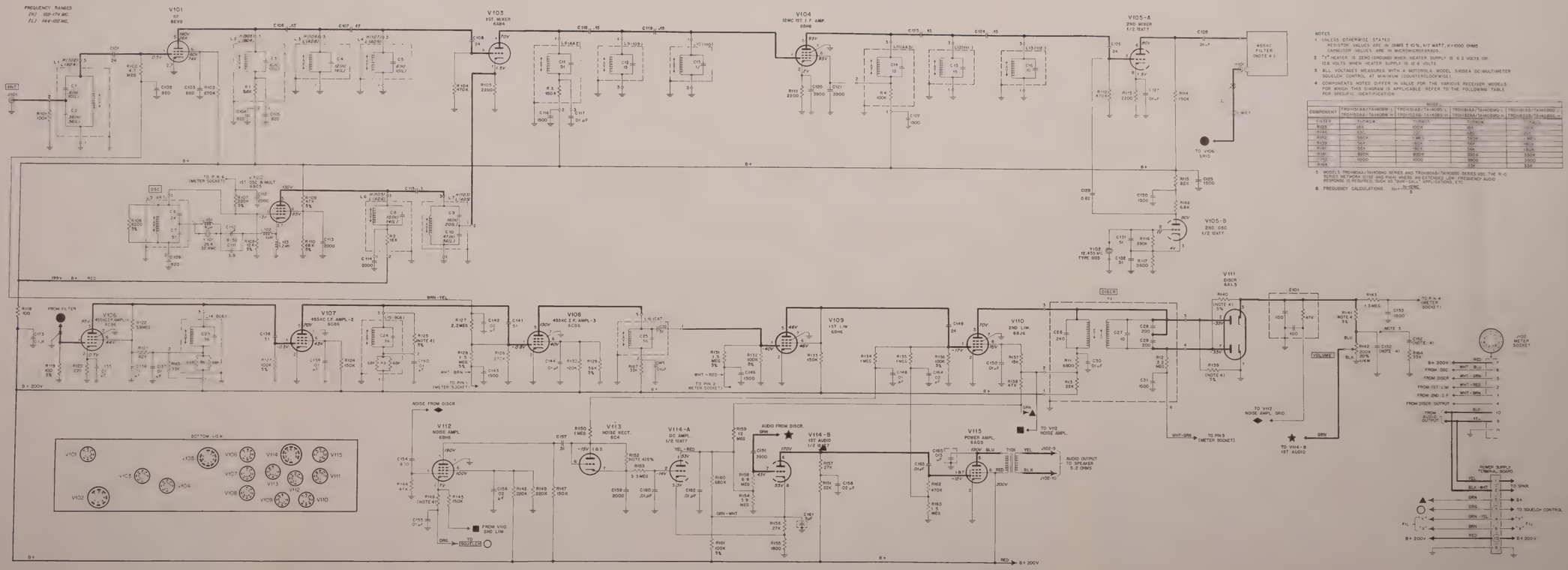
CRYSTAL

Crystals are part of the Radio Set model. When ordering a receiver chassis only, crystals must be ordered separately. Crystal type number and operating frequency must be specified when ordering crystal.

		CRYSTAL UNIT, quartz:
Y101, 201	Type RM10	Receiver Control; 27.2-32.4 mc; with 6 volt heater unit; for 144-174 mc carrier frequency
Y102	Type G03	Receiver IF; 12.455 mc

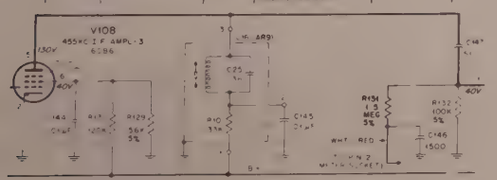
NOTE:

Replacement diodes must be ordered by Motorola part number only for optimum performance.


FREQUENCY RANGES
(H) 150-174 MC.
(L) 144-162 MC.
V101
RF
6BY6
V103
1ST. MIXER
6AB4
V104
12 MC 1ST I. F. AMP.
6BH6
V105-A
2ND MIXER
1/2 12AT7
V105-B
2ND. OSC
1/2 12AT7
V102
12.455 MC
TYPE 803
455KC
FILTER
(NOTE 4)
V106
455KC I.F. AMPL.-1
6CB6
V107
455KC I.F. AMPL.-2
6CB6
V108
455KC I.F. AMPL.-3
6CB6
V109
1ST. LIM
6BH6
V110
2ND. LIM.
6BJ6
V111
DISCR
6AL5
V112
NOISE AMPL.
6BH6
V113
NOISE RECT.
6C4
V114-A
DC AMPL.
1/2 12AT7
V114-B
1ST AUDIO
1/2 12AT7
V115
POWER AMPL.
6AQ5
OSC
2ND OSC. & MULT.
6BJ6
ANT.
FROM FILTER
TO V106 GRID
TO V112 NOISE AMPL. GRID
TO V114-B 1ST AUDIO
TO PIN 5 (METER SOCKET)
TO PIN 6 (METER SOCKET)
TO PIN 2 (METER SOCKET)
TO V112 NOISE AMPL.
FROM V110 2ND LIM
TO SQUELCH
AUDIO FROM DISCR.
AUDIO OUTPUT TO SPEAKER 3.2 OHMS
VOLUME
TO SPKR
TO SQUELCH CONTROL
B+ 200V
B+
BOTTOM VIEW
NOTES
1 UNLESS OTHERWISE STATED
RESISTOR VALUES ARE IN OHMS ± 10%, 1/2 WATT, K=1000 OHMS
CAPACITOR VALUES ARE IN MICROMICROFARADS.
2 "H" HEATER IS ZERO (GROUND) WHEN HEATER SUPPLY IS 6.3 VOLTS OR 12.6 VOLTS WHEN HEATER SUPPLY IS 12.6 VOLTS.
3 ALL VOLTAGES MEASURED WITH A MOTOROLA MODEL 5X39ZA DC MULTIMETER SQUELCH CONTROL AT MINIMUM (COUNTERCLOCKWISE).
4 COMPONENTS NOTED DIFFER IN VALUE FOR THE VARIOUS RECEIVER MODELS FOR WHICH THIS DIAGRAM IS APPLICABLE. REFER TO THE FOLLOWING TABLE FOR SPECIFIC IDENTIFICATION.
COMPONENT
MODEL
TRDH15AA/TA40BW-L
TRDH15AA/TA40BW-H
TRDH15AB/TA40BS-L
TRDH15AB/TA40BS-H
TRDH18AB/TA40BWD-L
TRDH18AB/TA40BWD-H
TRDH18AB/TA40BSD-L
TRDH18AB/TA40BSD-H
FILTER
TUNABW
TUNABW
TUNABW
TUNABW
R103
68K
100K
68K
100K
R104
470
470
470
470
R105
2200
2200
2200
2200
R106
560K
1 MEG
560K
1 MEG
R139
56K
180K
56K
180K
R140
56K
180K
56K
180K
R141
820K
820K
330K
330K
R142
1000
1000
3900
3900
R164
330
330
5 MODELS TRDH15AA/TA40BW SERIES AND TRDH18AB/TA40BSD SERIES USE THE R-C NETWORK SHOWN. FOR OPTIMUM SIGNAL TO NOISE RATIO AND EXTENDED LOW FREQUENCY AUDIO RESPONSE IS REQUIRED, SUCH AS "SAME-CALL" APPLICATIONS, ETC.
6 FREQUENCY CALCULATIONS... f0=f1-f2/3
MODEL TABLE
SERIES
MODEL
SUFFIX
CHANNEL SPACING
APPLICATION
TRDH15AA
TRDH15AA-TA40BW-A
TRDH15AA-TA40BW-H
1-3
1-3
25/30 KC
25/30 KC
MOBILE & BASE/CAMP
MOBILE & BASE/CAMP
TRDH15AB
TRDH15AB-TA40BS-L
TRDH15AB-TA40BS-H
1-3
1-3
25/30 KC
25/30 KC
MOBILE & SKYPAC
MOBILE & SKYPAC
TRDH18AB
TRDH18AB-TA40BWD-L
TRDH18AB-TA40BWD-H
1-3
1-3
50 KC
50 KC
*FAA NOTE 5
*FAA NOTE 5
TRDH18AB
TRDH18AB-TA40BSD-L
TRDH18AB-TA40BSD-H
1-3
1-3
50 KC
50 KC
*FAA NOTE 5
*FAA NOTE 5
PREVIOUS REVISIONS LISTED ON BACK OF THIS DIAGRAM
144-174 MC, Single-Frequency "Twin V" and Base Station Receiver Schematic Diagram
Motorola No. 63E862494-E
11/12/62-RS

REVISIONS

DIAG ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
[illegible]	TRD1151AA/ TA140BW-L-10 TRD1152AA/ TA140BW-H-10 TRD1151AB/ TA140BS-L-11 TRD1152AB- TA140BS-H-11 TRD1181AA/ TA140BWQ-L-8 TRD1182AA TA140BWQ-H-8 TRD1181AB TA140BSQ-L-4 TRD1182AB TA140BSQ-H-4	V101	WAS 6AK5	[illegible]
		R1	WAS 12K	
		R103	WAS 100K OHMS	
		L2L	WAS (AD7)	
		L2H	WAS (104) CIRCUIT WAS	
		C134	REMOVED .25 uf	B+ LINE TO RF STAGES
		C161	WAS 5 uf	V114B [illegible]
		C163	WAS 2000 uuf	[illegible]
		[illegible]	[illegible]	V115 PLATE
		T101	WAS 25K847479	PARTS LIST
B	[illegible] 81AA/ [illegible] BWQ-L-9 [illegible] 82AA/ [illegible] BWQ-H-9 [illegible] 81AB/ [illegible] SSQ-L-5 [illegible] 82AB/ [illegible] SSQ-H-5	R141	WAS 680K	COMPONENT TABLE IN NOTES
B1			MOTOROLA MODEL S1052A DC MULTI METER WAS VTVM	NOTE 5
B+	[illegible] CHANGE	C1L, C3L	WERE Z1R490602	PARTS LIST
		[illegible]	[illegible]	
		C1H, C5H	WERE 21R400072	
		C2L, C10L	WERE 21R114052	
		C2H, C23, C24	WERE 21R87127	
		C4H	WAS 21R[illegible]	
		[illegible]	WAS [illegible]	
		C11	WAS 21R[illegible]	
		C13, C21	WERE 21R[illegible]	
		C13, C14	WERE 21R475261	
		C16	WAS 21R890121	
		L102	WAS 24R840042	
		C[illegible]	WAS 24K840059	
		P101	WAS 28K84941[illegible]	
		W101	WAS 1V857908	
		V101	WAS TYPE DM10/RM10	
[illegible]	TRD1151, ZAA-11 TRD1151, ZAB-12 TRD1181, ZAA-10 TRD1181, ZAB-[illegible]	C147	REMOVED 51 uuf	IF AMPL - V108 PLATE
		R10	REMOVED 33K	
		[illegible]	WAS [illegible] (ABK)	
		C[illegible]	ADDED 51 uuf	
		R[illegible]	ADDED 33K CONNECT AS SHOWN BELOW	



REVISIONS

DIAG ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
[illegible]	TRD1151, 2AA-11 TRD1151, 2AB-12 TRD1181, 2AA-10 [illegible]		NOTE 6 ADDED	
D	[illegible]	[illegible]	ADDED 0.1 uf	B+ CIRCUIT (VICINITY V106)
F	[illegible]	R[illegible]	WAS 6R5585 (8.2 MEG)	V106 [illegible]
	[illegible]	R[illegible]	WAS 6R6046 (1 MEG)	V108 1

PARTS LIST for Schematic Diagram 63E862494-E

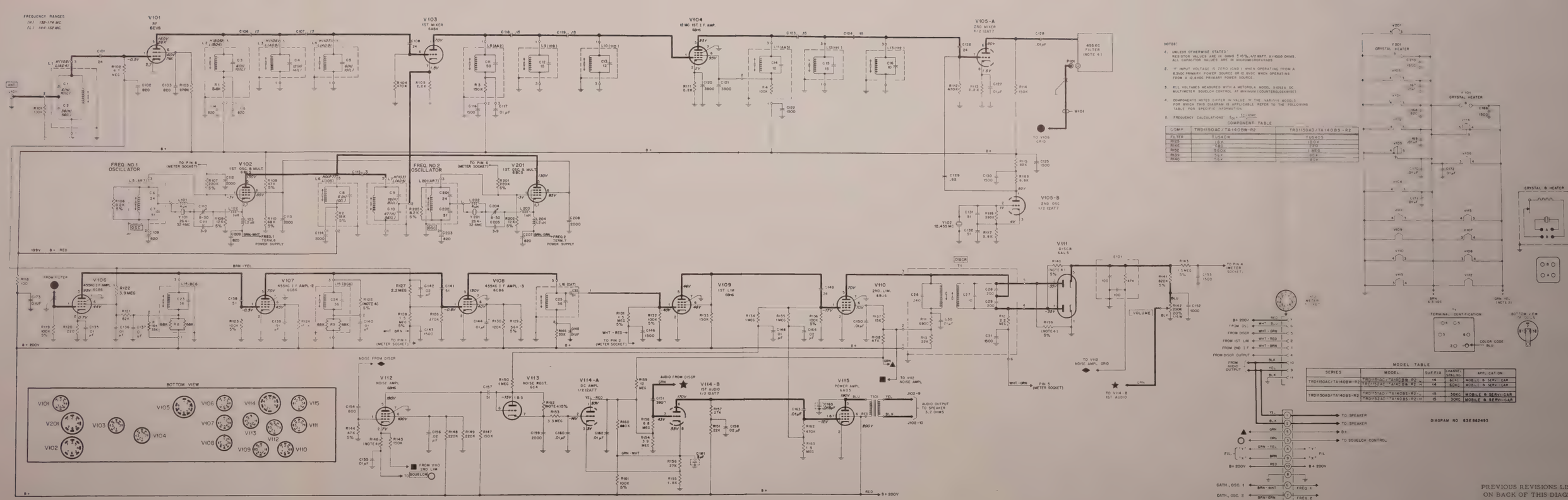
LEGEND
L = 144-152 MC
H = 152-174 MC

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
		CAPACITOR, fixed: uuf; 500 v; unl. stated
C1L, 3L, 5L, 8H	21R124710	10 ±.5 uuf; N330
C1H, 5H	21K849333	6 ±2.5 uuf; N330
C2L, 10L	21K863623	56 ±5%; N750
C2H, 23, 24, 25	21K834092	36 ±5%; N330
C3H	21R121918	6 ±.5 uuf; N470
C4L	21K836528	14 ±5%; N330
C4H	21R121958	12 ±5%; N330
C6	21K840716	24 ±5%
C7, 32, 131, 132, 138, 141, 157	21K840711	51 ±5%
C8L	21K836528	14 ±5%; N330
C9L	21R31492	20 ±5%; N75
C9H	21R119296	16 ±5%; N150
C10H	21R114207	47 ±10%; N750
C11	21K838729	51 ±5%; N80
C12, 15	21R114535	15 ±5%; N50
C13, 14	21R122049	12 ±5%; N150
C16	21K838686	10 ±5%; N150
C26	21K840048	240 ±5%
C27	21K840811	10 ±5%
C28, 29	21K840812	200 ±5%
C30, 117, 127, 128, 135, 136, 137, 139, 140, 144, 145, 148, 150, 155, 160, 162, 167, 169, 170, 171, 172	21B801139	.01 uf +80-20%; 600 v
C31, 116, 122, 125, 130, 143, 146, 153, 166	21B800801	1500 GMV +100% max.
C101, 108, 126, 149	21K840365	24 ±5%
C102, 103, 104, 105, 109, 168	21B837745	820 ±10%
C106, 107, 118, 119, 123, 124	21K881064	.15 ±5%
C110	20B840719	Var. 8-50
C111	21K838284	3.9 ±.25 uuf; 250 v
C112, 113, 114, 159	21K837746	2000 ±10%
C115	21K830201	.3 ±5%
C120, 121, 151	21K837996	3900 ±10%
C129	21K475679	.82 ±10%
C142, 156, 158, 164	21B401029	.02 uf +80-20%; 600 v
C152	21K847601 or 21K837996	1000 ±5%; 60 kc models only 3900 ±10%; 30 kc models only
C154	21K840049	800 ±5%; 300 v
C161	23C82601A15	3 uf +150-10%; 100 v
C163	8K847105	.01 uf ±20%; 400 v
C165	8K859639	.015 uf ±10%; 400 v
C173	8K858371	0.1 uf ±10%; 400 v
		CAPACITOR-RESISTOR ASSEMBLY
E101	21K842354	c/o; Dual CAPACITOR; printed circuit, each sect. 100 uuf; 300 v One RESISTOR; fixed: 47K ±20%
		CONNECTOR, recept:
J101	9A87120	female; single cont.
J102	9B86864	female; 11 cont. does not incl. 42A821428 RING, connector retainer
		COIL, RF:
L1L	24K836515	Ant. stamped AD4; incl; 76A824120 CORE, tuning; ref. C1L, C2L
L1H	24B824102	Ant. stamped 102; incl. 76A824120 CORE, tuning; ref. C1H, C2H
L2L	24V80900A53	Plate; stamped BQ4; incl; 76A824120 CORE, tuning; ref. C3L, R1
L2H	24V80900A54	Plate; stamped BQ5; incl; 76A824120 CORE, tuning; ref. C3H, R1
L3L	24K836519	Cplg; stamped AD8; incl. 76A824120 CORE, tuning; ref. C4L
L3H	24B824106	Cplg; stamped 106; incl; 76A824120 CORE, tuning; ref. C4H
L4L	24K836520	Mixer Grid; stamped AD9; incl. 76A824120 CORE, tuning; ref. C5L
L4H	24K824107	Mixer Grid; stamped 107; incl; 76A824120 CORE, tuning; ref. C5H
L5	24B840709	1st Osc. stamped AR7; incl; 46K881276 CORE, tuning; coded ORANGE; ref. C6, C7
L6L	24K836517	1st Mult; stamped AD6; incl; 76A824120 CORE, tuning and ref. C8L, R2
L6H	24K824105	1st Mult; stamped 105; incl. 76A824120 CORE, tuning and ref. C8H, R2
L7L	24K836516	Injection; stamped AD5; incl; 76A824120 CORE, tuning; ref. C9L, C10L
L7H	24K824103	Injection; stamped 103; incl; 76A824120 CORE tuning; ref. C9H, C10H
		COIL, IF:
L8	24K834778	12 mc IF -1; stamped AA2; incl; 76A824118 CORE, tuning; ref; C11, R3
L9	24B824109	12 mc IF -2 stamped 109, incl; 76A824118 CORE, tuning; ref. C12
L10	24B824110	12 mc IF -3; stamped 110; incl. 76A824118 CORE, tuning; ref; C13
L11	24K834779	12 mc IF -4; stamped AA3; incl; 76A824118 CORE, tuning; ref. C14
L12	24K824111	12 mc IF -5; stamped 111; incl; 76A824118 CORE, tuning; ref. C15
L13	24K824112	12 mc IF -6; stamped 112; incl; 76A824118 CORE, tuning; ref. C16
L14	24K854048	2nd IF -1; stamped BC6; incl; 46K891110 CORE, tuning; coded GRN and ref. C23, R8 same as L14 except 2nd IF -2 incl; ref. C24, R9
L15		
L16	24V80901A62	2nd IF -3; stamped CA7; incl; 46K891110 CORE, tuning; ref. C25, C32
		COIL, RF:
L101	24K868885	choke; 4 uh; coded RED-BLK
L102	24K861264	choke; 1 uh; coded BLK-BLK
L103	24D859162	choke; 1.2 uh; coded BLK
		CONNECTOR, plug: male;
P101	28A474006	single cont.
		RESISTORS, fixed: ±10%; 1/2 w; unl. stated;
R1	6R6117	5.6K
R2	6R5591	18K
R3, 114, 124, 133, 145, 147	6R6398	150K
R4, 101	6R6031	100K
R8, 9	6R6074	68K; 2 req'd.
R11, 166	6R6428	6.8K
R12, 127	6R6433	2.2 meg
R13, 151	6R6397	22K
R102	6R6446	4.7 meg
R103, 126	6R6414	270K
R104, 112, 162	6R6377	470K
R105, 111, 113	6R6069	2.2K
R106	6R400490	8.2K ±5%
R107	6R400066	220K ±5%
R108	6R2075	12K ±5%
R109, 138, 144	6R5772	47K ±5%
R110	6R6479	68K ±5%
R115, 121	6R5644	82K
R116	6R5646	390K
R117	6R6117	5.6K
R118	6R6326	100
R119, 123, 132, 136, 161	6R5553	100K ±5%
R120	6R6270	220
R122	6R490110	3.9 meg
R125	6R488095 or 6R5553	18K ±5%; 60 kc models only 100K ±5%; 30 kc models only
R128, 131, 163	6R400228	1.5 meg ±5%
R129	6R401006	56K ±5%
R130	6R5631	120K
R134, 135, 150	6R6046	1 meg
R137	6R6477	15K
R139, 140	6R401006 or 6R2061	56K ±5%; 60 kc models only 180K ±5%; 30 kc models only
R141	6R5773 or 6R2096	820K ±5%; std. audio freq. range models only. 330K; extended audio freq. range models only
R142	18K845110	Var; 200K ±20%; 1/4 w
R143	6R6460	1.5 meg
R146	6R6040 or 6R6270	680; 60 kc models only 220; 30 kc models only
R148, 149	6R6407	220K
R152	6R5796 or 6R5587	560K ±5%; 60 kc models only 1 meg ±5%; 30 kc models only
R153	6R6497	3.3 meg
R154	6R490110	3.9 meg
R155	6R2089	1.8K
R156, 157	6R6434	27K
R158	6R2097	6.8 meg
R159	6R400334	12 meg
R160	6R6475	680
R164	6R6410	33K; extended audio freq. range models only
R165, 167	6R6410	33K
		TRANSFORMER.
T1	1V842353	Discr. coded BLUE; incl. two 76A821495 CORE, tuning; coded YELLOW; ref. C26, 27, 28, 29, 30, 31, R11, 12 and 13
T101	25C82804B01	AF; output 5K ohm to 3.2 ohm at 55 ma. d-c
		ELECTRON TUBE:
V101	95T296A01	Type 6EV5
V102	95T225A01	Type 6CE5/6BC5
V103	95T212A01	Type 6AB4
V104, 109, 112	95T175A01	Type 6BH6
V105, 114	95T113A02	Type 12AT7
V106, 107, 108	95T147A03	Type 6CB6
V110	95T176A01	Type 6BJ6
V111	95T111A03	Type 6AL5
V113	95T179A01	Type 6C4
V115	95T101A01	Type 6AQ5
		LINE, RF transmission:
W101	1V80711A92	assy; incl. 30B475378 CABLE, RF; coaxial; RG-58A/U; 4-1/4" lgth; req'd; incl; ref. part P101
		SOCKET, tube:
XV101, 102	9B834083	female; 7 cont.
XV103, 104	9K87124	female; 7 cont.
XV105	9B881243	female; 9 cont.
XV106, 107	9K849460	7 cont.
XV108, 109, 110, 111, 112, 113, 115	9A87123	7 cont.
XV114	9A86868	female; 9 cont.
		SOCKET, crystal.
XY101	9K857508	female; 4 cont.
XY102	9K861367	female; 2 cont.

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
"PERMAKAY" IF FILTER		
	TU540S	30 kc channel spacing
	TU540W	60 kc channel spacing
CRYSTAL		
Y101	Type RM10	CRYSTAL UNIT. (SEE NOTE) Quartz; Receiver Control Oscillator; 26.4-32.4 mc; with .6 volt heater unit
Y102	Type G03	Quartz; Receiver IF Oscillator; 12.455 mc

NOTE:

Crystals are part of the Radio Set model. When ordering a receiver chassis only, crystals must be ordered separately. Crystal type number and operating frequency must be specified when ordering crystal.



NOTES:

4. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS ± 10%, 1/2 WATT. K=1000 OHMS.
   ALL CAPACITOR VALUES ARE IN MICROMICROFARADS
2. "B" INPUT VOLTAGE IS ZERO (GND.) WHEN OPERATING FROM A 6.3VDC PRIMARY POWER SOURCE OR 12.6VDC WHEN OPERATING FROM A 12.6VDC PRIMARY POWER SOURCE.
3. ALL VOLTAGES MEASURED WITH A MOTOROLA MODEL 810B/A DC MULTIMETER SQUELCH CONTROL AT MINIMUM (COUNTERCLOCKWISE)
4. COMPONENTS NOTED DIFFER IN VALUE IN THE VARIOUS MODELS FOR WHICH THIS DIAGRAM IS APPLICABLE. REFER TO THE FOLLOWING TABLE FOR SPECIFIC INFORMATION.
5. FREQUENCY CALCULATIONS: $f_{OSC} = f_{IN} - 12.455MC$

COMPONENT TABLE

COMP.	TRD1150AC/TA140BW-R2	TRD1150AD/TA140BS-R2
FILTER	TU540W	TU540S
R105	18K	100K
R140	180	180
R152	560K	1 MEG
R153	5K	60K
R140	5.6K	82K

MODEL TABLE

SERIES	MODEL	SUFFIX	CHANNEL SPACING	APPLICATION
TRD1150AC/TA140BW-R2	TRD1152AC-*/TA140BW-R2-*	-14	60KC	MOBILE & SERVICE
	TRD1152AC-*/TA140BW-R2-M	-14	60KC	MOBILE & SERVICE
TRD1150AD/TA140BS-R2	TRD1152AD-*/TA140BS-R2-*	-15	30KC	MOBILE & SERVICE
	TRD1152AD-*/TA140BS-R2-M	-15	30KC	MOBILE & SERVICE

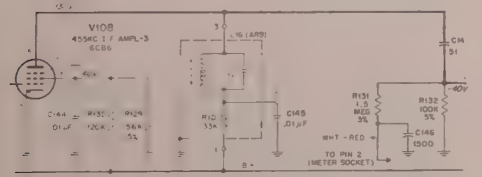
DIAGRAM NO 63E862493

PREVIOUS REVISIONS LISTED ON BACK OF THIS DIAGRAM

144-174 MC, Two-Frequency "Twin V" and Base Station Receiver Schematic Diagram
Motorola No. 63E862493-D
11/12/62-RS

REVISIONS

DIAG ISSUE	CHASSIS AND SUFFIX NO	REF SYMBOL	CHANGE	LOCATION
[illegible]	[illegible]	C1L, C3L, [illegible]	WERE 21R490602	PARTS LIST
		[illegible]	[illegible]	
		C10L		
		C23, C23[illegible]	WERE 21R87127	
		[illegible]	WAS 21R490605	
		[illegible]	[illegible]	
		[illegible]	[illegible]	
		[illegible]	WAS 21R890124	
		[illegible]	WAS 24K854048	
		[illegible]	WERE 24B840042	
		[illegible]	[illegible]	
		P101	WAS 28K849416	
		W101	WAS 1V857900	
		[illegible]	WAS 9B834083	
		[illegible]	[illegible]	
		Y101, Y201	WERE Type DM10, RM10	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		L16	[illegible] (AKW)	
		C32	ADDED 51 uuf	
		R166	ADDED 33K CIRCUIT WAS AS SHOWN BELOW	



[illegible]	TRD1151, 2AC-12 TRD1151, 2AD-13		[illegible] TF 5 ADDED	
[illegible]	TRD1151, 2AC-13 TRD1151, 2AD-14	C173	ADDED 0.1 uf	B+ CIRCUIT (VICINITY V106)
[illegible]	TRD1151, 52AC-14 TRD1151, 52AD-15	R122	WAS 6R5585 (8.2 MEG)	[illegible]
		R127	WAS 6R6046 (1 MEG)	V108-1

PARTS LIST for Schematic Diagram 63E862493-D

LEGEND
L = 144-152 MC
H = 152-174 MC

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
		CAPACITOR, fixed: uuf; 500 v; unl. stated
C1L, 3L, 5L, 8L	21R124710	10 ±. 5 uuf; N330
C1H, 5H	21K849333	6 ±2. 5 uuf; N330
C2L, [illegible]	21K863623	56 ±5%; N750
C2H, 3H, 4H, 5H	21K834092	36 ±5%; N330
[illegible]H	21R121918	6 ±. 5 uuf; N470
C4L	21K836528	14 ±5%; N330
C4H	21R121958	12 ±5%; N330
C6, 201	21K840716	24 ±5%
C7, 32, 131, 132, 138, 141, 157, 202	21K840711	51 ±5%
C8H	21K838113	6 ±. 25 uuf; N750
C9L	21R31492	20 ±[illegible] N75
C9H	21R119296	16 ±[illegible] N150
C10H	21R[illegible]	[illegible] N750
C11H	21R[illegible]	[illegible] N80
C12, 15	21K[illegible]	[illegible] N80
C13, 14	21R122049	12 ±5%; N150
C16	21K838686	10 ±5%; N150
C26	21K840048	240 ±5%
C27	21K840811	10 ±5%
C28, 29	21K840812	200 ±5%
C30, 117, 127, 128, 135, 136, 137, 139, 140, 144, 145, 148, 150, 155, 160, 162, 167, 169, 170, 171, 172	21B801139	.01 uf +80-20%; 600 v
C31, 116, 122, 125, 130, 143, 146, 153, 166, Z10	21B800801	1500 GMV +100% max.
C101, 108, 126, 149	21K840365	25 ±5%
C102, 103, 104, 105, 109, 168, 203, 207, 209	21B837745	820 ±10%
C106, 107, 118, 119, 123, 124, 204	21K881064	.15 ±5%
C110	20B840719	Var; 8-50
C111, 205	21K838284	3.9 ±. 25 uuf; 250 v
C112, 113, 114, 159, 208	21K837746	2000 ±10%
C115	21K830201	.3 ±5%
C120, 121, 151	21K837996	3900 ±10%
C129	21K475679	.82 ±10%
C142, 156, 158, 164	21B401029	.02 uf +80-20%; 600 v
C152	21K847601	1000 ±5%
C154	21K840049	800 ±5%; 300 v
C161	23C82601A15	3 uf +150-10%; 100 v
C163	8K847105	.01 uf ±20%; 400 v
C165	8K859639	.015 uf ±10%; 400 v
C173	8K858371	0.1 uf ±10%; 400 v
E101	21K842354	CAPACITOR-RESISTOR ASSEMBLY Consists of: Dual CAPACITOR; printed circuit; each sect. 100 uuf; 300 v; One RESISTOR; fixed: 47K ±20%
J101	9A87120	CONNECTOR, recept: female; single cont.
J102	9B86864	female; 11 cont. does not incl. 42A821428 RING, connector retainer
L1L	24K836515	COIL, RF: Ant. stamped AD4; incl. 76A824120 CORE, tuning; ref. C1L, C2L
L1H	24B824102	Ant. stamped 102; incl. 76A824120 CORE, tuning; ref. C1H, C2H

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
L2L	24V80900A53	Plate; stamped BQ4; incl. 76A824120 CORE, tuning; ref. C3L, R1
L2H	24V80900A54	Plate, stamped BQ5, incl. 76A824120 CORE, tuning, ref. C3H, R1
L3L	24K836519	Cplg; stamped AD8; incl. 76A824120 CORE, tuning; ref. C4L
L3H	24B824106	Cplg; stamped 106; incl. 76A824120 CORE, tuning ref. C4H
L4L	24K836520	Mixer Grid; stamped AD9; incl; 76A824120 CORE, tuning; ref. C5L
L4H	24K824107	Mixer Grid; stamped 107; incl. 76A824120 CORE, tuning; ref. C5H
L5, 201	24B840709	1st Osc. stamped AR7; incl. 46K881276 CORE, tuning; coded ORANGE, ref. C6, C7
L6L	24K824105	1st Mult. stamped 105, incl 76A824120 CORE tuning and ref. parts C8L, R2
L6H	24B838987	1st Mult. stamped AP7; incl. 76A824120 CORE, tuning and ref. parts C8H, R2
L7L	24K836516	Injection; stamped AD5; incl. 76A824120 CORE, tuning; ref. C9L, C10L
L7H	24K824103	Injection; stamped 103; incl; 76A824120 CORE, tuning; ref. C9H, C10H
		COIL, IF:
L8	24K834778	12 mc IF -1; base stamped AA2; incl; 76A824118 CORE, tuning; ref. C11, R3
L9	24B824109	12 mc IF -2 stamped 109; incl; 76A824118 CORE, tuning; ref. C12
L10	24B824110	12 mc IF -3; stamped 110; incl; 76A824118 CORE, tuning; ref. C13
L11	24K834779	12 mc IF -4; stamped AA3; incl; 76A824118 CORE, tuning; ref. C14
L12	24K824111	12 mc IF -5; stamped 111; incl; 76A824118 CORE, tuning; ref. C15
L13	24K824112	12 mc IF -6; stamped 112; incl; 76A824118 CORE, tuning; ref; C16
L14	24K854048	2nd IF -1; stamped BC6; incl; 46K891110 CORE, tuning; coded GRN and ref. parts C23, R8 same as L14 except 2nd IF -2 incl. ref. C24, R9
L15		
L16	24V80901A62	2nd IF; stamped CA7; incl. 46K891110 CORE, tuning & ref. C25, C32
		COIL, RF:
L101, 202	24K868885	choke; 4 uh; coded RED-BLK
L102, 203	24K861264	choke; 1 uh; coded BLK-BLK
L103, 204	24D859162	choke; 1.2 uh; coded BLK
		CONNECTOR, plug; male:
P101	28A474006	Single cont.
		RESISTOR, fixed: ±10%; 1/2 w; unl. stated;
R1	6R6117	5.6K
R2	6R488095	18K ±5%
R3, 114, 124, 133, 145, 147	6R6398	150K
R4, 101	6R6031	100K
R8, 9	6R6074	68K; 2 req'd.
R11, 165	6R6428	6.8K
R12, 127	6R6433	2.2 meg.
R13, 151	6R6397	22K

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
R102	6R6446	4.7 meg.
R103, 126	6R6414	270K
R104, 112, 162	6R6377	470K
R105, 111, 113	6R6[illegible]	3.3K
R106, 2[illegible]	6R4[illegible]0	4.2K ±5%
R107, 201	6R400066	220K ±5%
R108, 202	6R2075	12K ±5%
R109, 138	6R6048	47K
R110	6R6479	68K ±5%
R115, 121	6R5644	82K
R116	6R5646	390K
R117	6R6117	5.6K
R118	6R6326	100
R119, 123, 132, 136, 161	6R5553	100K ±5%
R120	6R6270	220
R122	6R490110	3.9 meg
R125	6R488095 or 6R5553	18K ±5%; 60 KC models only 100K ±5%; 30 KC models only
R128, 131, 143	6R40028	1.5 meg ±5%
R129	6R401006	56K ±5%
R130	6R5631	120K
R134, 135, 150	6R6[illegible]	1 meg
R137	6R6477	15K
R139, 140	6R401006 or 6R2061	56K ±5%; 60 KC models only 180K ±5%; 30 KC models only
R141	6R5773	820K ±5%
R142	18K845110	var; 200K ±20%; 1/4 w
R144	6R5772	47K; ±5%
R146	6R6040 or 6R6270	680; 60 KC models only 220; 30 KC models only
R148, 149	6R6407	220K
R152	6R5796 or 6R5587	560K ±5%; 60 KC models only 1 meg ±5%; 30 KC models only
R153	6R6497	3.3 meg
R154	6R490110	3.9 meg
R155	6R2089	1.8K
R156, 157	6R6434	27K
R158	6R2097	6.8 meg
R159	6R400334	12 meg
R160	6R6475	680K
R163	6R6460	1.5 meg
R164, 166	6R6410	33K
		TRANSFORMER:
T1	1V842553	Discr, coded BLUE; incl. two 76A821495 CORE, tuning; coded YELLOW; ref. C26, 27, 28, 29, 30, 31, R11, 12 and 13
T101	25C82804B01	AF; output; 5K ohm to 3.2 ohm at 55 ma. d-c
		ELECTRON TUBE:
V101	95T296A01	type 6EV5
V102, 201	95T225A01	type 6CE5/6BC5
V103	95T212A01	type 6AB4
V104, 109, 112	95T175A01	type 6BH6
V105, 114	95T113A02	type 12AT7
V106, 107, 108	95T147A03	type 6CB6
V110	95T176A01	type 6BJ6
V111	95T111A03	type 6AL5
V113	95T179A01	type 6C4
V115	95T101A01	type 6AQ5
		LINE, RF transmission:
W101	1V80711A92	assy, incl; 30B475378 CABLE, RF; coaxial; RG-58A/U; 4-1/4" lgth req'd. incl. ref. part P101
		SOCKET, tube:
XV101, 102, 201	9B834083	female; 7 cont.
XV103, 104	9K87124	female; 7 cont.
XV105	9B881243	female; 9 cont.
XV106, 107	9K849460	7 cont.
XV108, 109, 110, 111, 112, 113, 115	9B87123	7 cont.
XV114	9B86868	female; 9 cont.
		SOCKET, crystal:
XV101, 201	9K857508	female; 4 cont.
XY102	9K861367	female; 2 cont.

REFERENCE SYMBOL	MOTOROLA PART No	DESCRIPTION
"PERMAKAY" IF FILTER		
	TU540S	30 kc channel spacing
	TU540W	60 kc channel spacing
CRYSTAL		
Y101, 201	Type RM10	CRYSTAL UNIT, (SEE NOTE) Quartz; Receiver Control Oscillator; 26.4-32.4 MC; with 6 volt heater unit
Y102	Type G03	Quartz; Receiver IF Oscillator, 12,455 MC.

NOTE:

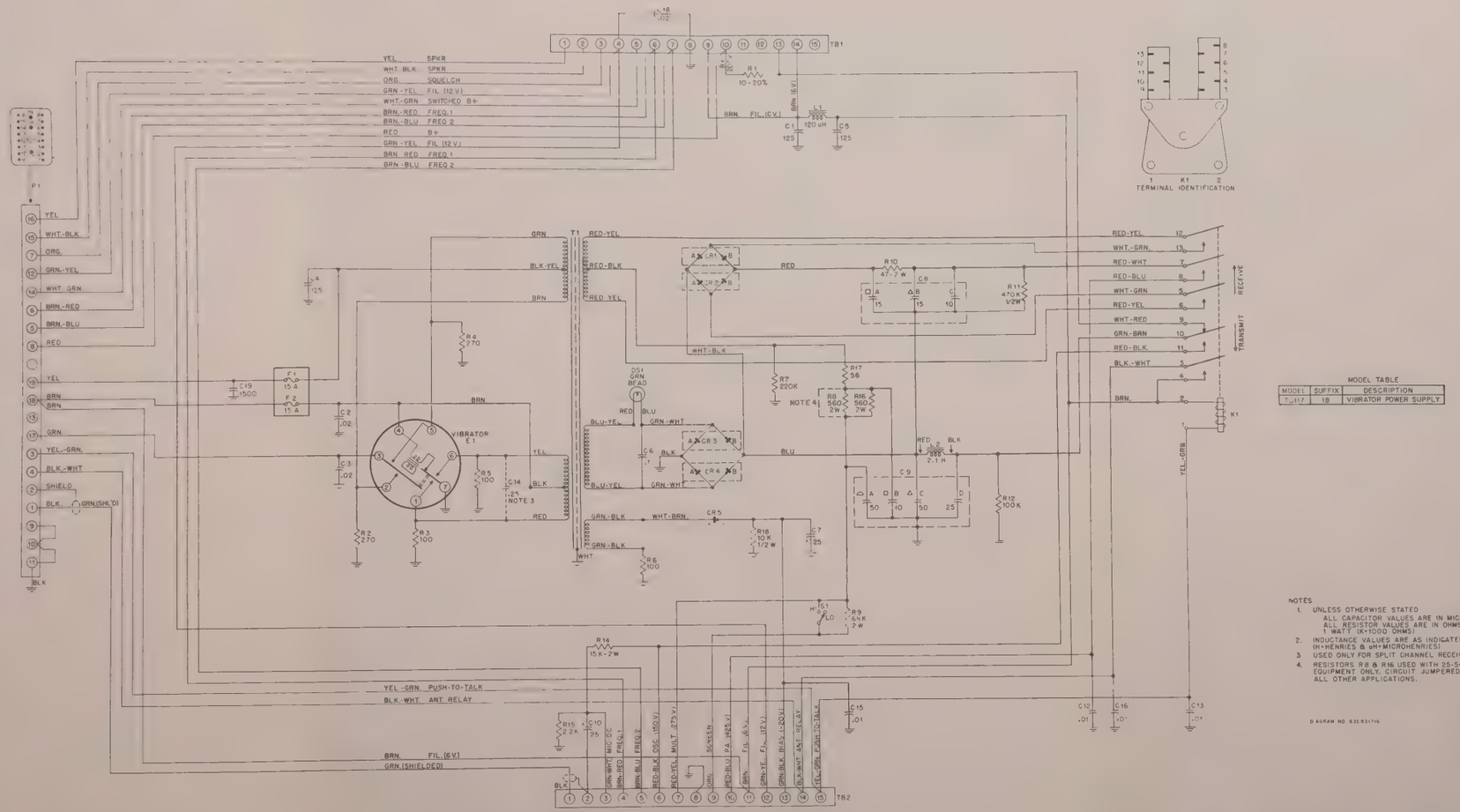
Crystals are part of the Radio Set model. When ordering a receiver chassis only, crystals must be ordered separately. Crystal type number and operating frequency must be specified when ordering crystal

POWER SUPPLY

MODEL TU117

PERFORMANCE SPECIFICATIONS

PRIMARY POWER	6.3 or 12.6 v d-c
OUTPUT RATINGS	Receiver 190 v d-c at 70 ma. Transmitter 150 v d-c at 18 ma. 275 v d-c at 55 ma. 425 v d-c at 123 ma. -20 v d-c bias



MODEL TABLE

MODEL	SUFFIX	DESCRIPTION
T-117	18	VIBRATOR POWER SUPPLY

NOTES

1. UNLESS OTHERWISE STATED
   ALL CAPACITOR VALUES ARE IN MICROFARADS
   ALL RESISTOR VALUES ARE IN OHMS, ±10%,
   1 WATT (K=1000 OHMS)
2. INDUCTANCE VALUES ARE AS INDICATED
   (H=HENRIES & μH=MICROHENRIES)
3. USED ONLY FOR SPLIT CHANNEL RECEIVER OPERATION.
4. RESISTORS R8 & R16 USED WITH 25-54 MC EQUIPMENT ONLY. CIRCUIT JUMPERED FOR ALL OTHER APPLICATIONS.

DIAGRAM NO. 63E83174G

PREVIOUS REVISIONS LISTED ON BACK ON THIS DIAGRAM →

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Issue - O

REVISIONS

DIAG ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
--	TU117-18	--	WAS T1	T1-SEC

PARTS LIST for Schematic Diagram 63E831716-V1

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITOR, fixed: uf; unl. stated:
C1, 4, 5	23K840707	125 +100-10%; 16 v
C2, 3, 18	21B401029	.02 +80-20%; 600 v
C6	8K831678	0.1 ±10%; 1000 v
C7, 10	23K850516	25 +100-10%; 50 v
C8	23K890002	3 sect:
		c/o:
C8A		□ 15 +50-10%; 450 v
C8B		△ 15 +50-10%; 450 v
C8C		10 +50-10%; 450 v
C9	23K857835	4 sect;
		c/o:
C9A		⌓ 50 +50-10%; 450 v
C9B		□ 10 +50-10%; 450 v
C9C		△ 50 +50-10%; 300 v
C9D		25 +50-10%; 300 v
C12, 13, 15, 16	21B801139	.01 +80-20%; 600 v
C14	8K837041	.25 +30-20%; 200 v
C19	21B800801	1500 uuf GMV +100% max; 500 v
		RECTIFIER, metallic:
CR1, 2, 3, 4	48C800715	selenium; dual;
		c/o:
CR1A, 2A, 3A, 4A		8 plate
CR1B, 2B, 3B, 4B		8 plate
CR5	48A800116	selenium; 1 plate
		VIBRATOR,
E1	48C830082 or 48C847730	non-synch; 6 volt; split reed; dual interrupter type; male 7 cont. plug-in base
		FUSE, cartridge:
F1, 2	65K804906	slow-blow type; 15 amp. 32 volt
		LAMP, incand:
DS1	65K831645	3.2 volt; .35 amp. single cont. min. bay. base; green bead
		RELAY, armature:
K1	80K831612	6 v d-c; 2 stack; cont. arrangement; 1st stack, 1 form "A" and 1 form "C"; 2nd stack, 3 form "A"; does not incl: 15K848892 COVER, relay or 7A811735 BRACKET, relay cover
		COIL, RF:
L1	24A812763	choke; 120 uh
		REACTOR,
L2	25B837416	filter, 2.1 h
		CONNECTOR, plug:
P1	28C802820	male; 19 cont.
		RESISTOR, fixed: ±10%; 1 w; unl. stated:
R1	6R118205	10 ±20%
R2, 4	6R6336	270
R3, 5, 6	6R6415	100
R7	6R5574	220K
R8, 16	6R488036	560; 2 w
R9	6R2079	68K; 2 w
R10	6R488035	47; 2 w
R11	6R6377	470K; 1/2 w
R12	6R6328	100K
R14	6R5732	15K; 2 w
R15	6R6409	2.2K
R17	6R2037	56
R18	6R6320	10K; 1/2 w
		SWITCH,
S1	40A482097	toggle; S. P. S. T.
		TRANSFORMER,
T1	25D830215	power: vibrator; incl: pri. #1; leads; GRN, BRN and BLK-YEL center tap

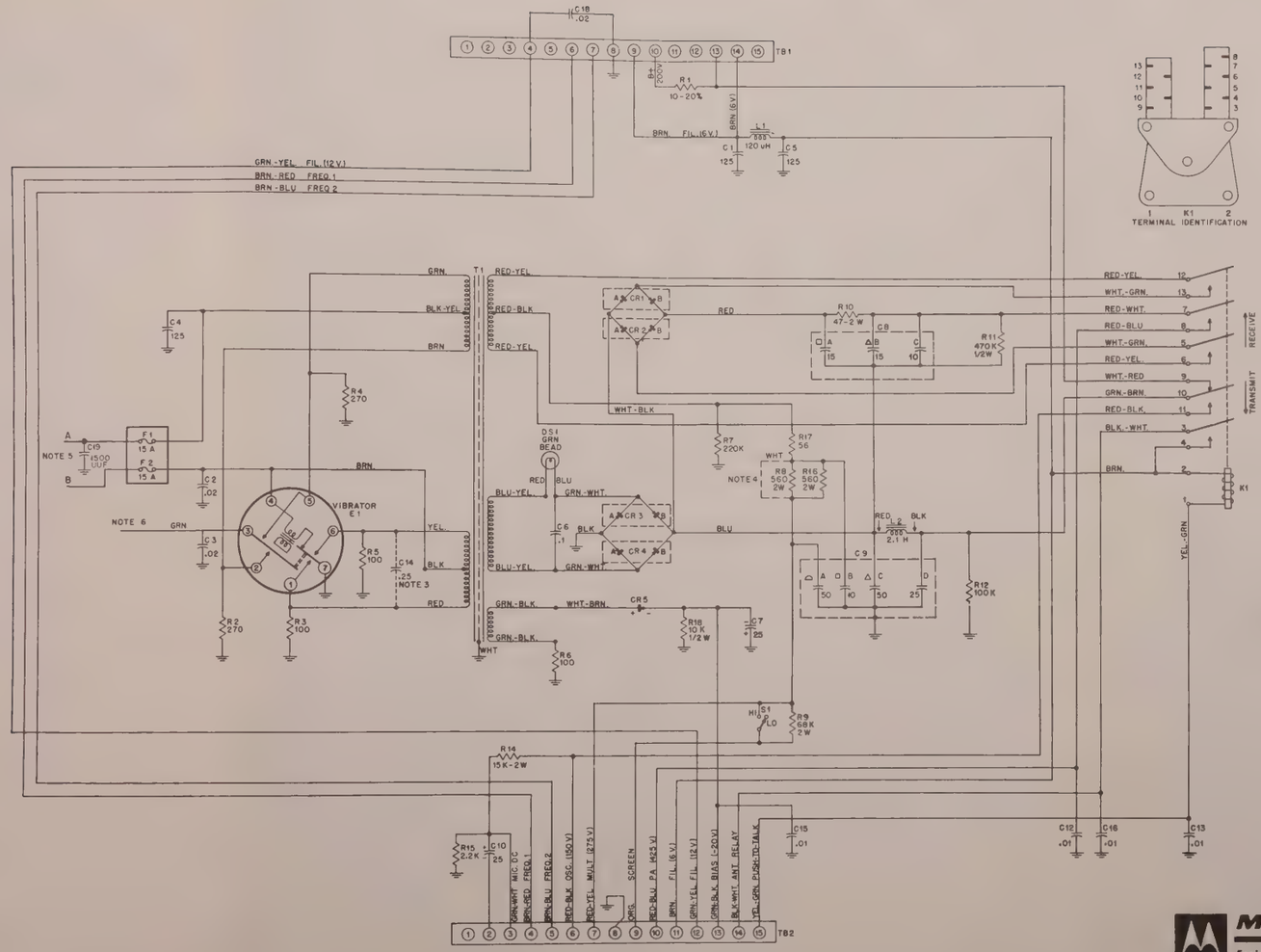
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		pri. #2; leads; YEL, RED and BLK center tap
		sec. #1; leads; RED-YEL, RED-YEL and RED-BLK center tap
		sec. #2; leads; BLU-YEL, BLU-YEL
		sec. #3; leads; GRN-BLK, GRN-BLK
		BOARD, terminal:
TB1, 2	31B802699	14 solder lug term.
		SOCKET, vibrator:
XE1	9A6776	female; 7 cont.
		FUSEHOLDER,
XF1, 2	31K835455	dual fuse mounting
		LAMPHOLDER,
XDS1	9A813001	min. single cont. bay. base; incl: BLU and RED coded, 4" leads

POWER SUPPLY

MODEL TU117-F

PERFORMANCE SPECIFICATIONS

PRIMARY POWER	6.3 or 12.6 v d-c
OUTPUT RATINGS	Receiver 190 v d-c at 70 ma. Transmitter 150 v d-c at 18 ma. 275 v d-c at 55 ma. 425 v d-c at 123 ma. -20 v d-c bias



MODEL TABLE

MODEL	SUFFIX	DESCRIPTION
TU117F	12	VIBRATOR POWER SUPPLY

NOTES:

1. UNLESS OTHERWISE STATED:
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
   ALL RESISTOR VALUES ARE IN OHMS, ±10%.
   1 WATT. (K=1000 OHMS)
2. INDUCTANCE VALUES ARE AS INDICATED (H=HENRIES & uH=MICROHENRIES)
3. USED ONLY FOR SPLIT CHANNEL RECEIVER OPERATION.
4. RESISTORS R8 & R16 USED WITH 25-54 MC. EQUIPMENT ONLY. CIRCUIT JUMPERED FOR ALL OTHER APPLICATIONS.
5. POINTS A & B CONNECT TO 6 OR 12 V DC IN THE CONTROL PANEL. REFER TO INTERCABLING DIAGRAM.
6. CONNECTS TO PIN 8 OF POWER INPUT PLUG.

PREVIOUS REVISIONS LISTED ON BACK OF THIS DIAGRAM

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Issue - O

REVISIONS

DIAG ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
1.			TU117F-12 WAS TU117-12	MODEL TABLE
1.	TU117F-12	DS1	WAS 11	T1-SEC.
		1.	ADDED 1500 UUF	T1-PRI.

PARTS LIST for Schematic Diagram 63E835298-P2

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITOR, fixed; uf; unl. stated:
C1, 4, 5	23K840707	125 +100-10%; 16 v
C2, 3, 18	21B401029	.02 +80-20%; 600 v
C6	8K831678	0.1 ±10%; 1000 v
C7, 10	23K850516	25 +100-10%; 50 v
C8	23K890002	3 sect.; c/o:
C8A		□ 15 +50-10%; 450 v
C8B		△ 15 +50-10%; 450 v
C8C		10 +50-10%; 450 v
C9	23K857835	4 sect: c/o:
C9A		⌓ 50 +50-10%; 450 v
C9B		□ 50 +50-10%; 450 v
C9C		△ 30 +50-10%; 300 v
C9D		25 +50-10%; 300 v
C12, 13, 15, 16	21B801139	.01 +80-20%; 600 v
C14	8K837041	0.25 +30-20%; 200 v
C19	21B800801	1500 uuf GMV +100%; max. 500 v
		RECTIFIER, metallic;
CR1, 2, 3, 4	48C800715	selenium; dual; c/o:
CR1A, 2A, 3A, 4A		8 plate
CR1B, 2B, 3B, 4B		8 plate
CR5	48A800116	selenium; 1 plate
		VIBRATOR,
E1	48C830082 or 48C847730	non-synch; 6 volt; split reed; dual interrupter type; male; 7 cont; plug-in base
		FUSE, cartridge:
F1, 2	65K804906	slow blow type; 15 amp; 32 volt
		LAMP, incand:
DS1	65K831645	3.2 volt; .35 amp; single cont. min. bay. base; green bead
		RELAY, armature:
K1	80K831612	6 v d-c; 2 stack; cont. arrangement; 1st stack, 1 form "A" and 1 form "C"; 2nd stack, 3 form "A" does not incl: 15K848892 COVER, relay or 7A811735 BRACKET, relay cover
		COIL, RF:
L1	24A812763	choke; 120 uh
		REACTOR,
L2	25B837416	filter: 2.1 h
		RESISTOR, fixed: ±10%; 1 w; unl. stated:
R1	6R118205	10 ±20%
R2, 4	6R6336	270
R3, 5, 6	6R6415	100
R7	6R5574	220K
R8, 16	6R488036	560; 2 w
R9	6R2079	68K; 2 w
R10	6R488035	47; 2 w
R11	6R6377	470K; 1/2 w
R12	6R6328	100K
R13	6R5598	390
R14	6R5732	15K; 2 w
R15	6R6409	2.2K
R17	6R2037	56
R18	6R6320	10K; 1/2 w
		SWITCH,
S1	40A482097	toggle; spst
		TRANSFORMER,
T1	25D830215	power: vibrator; incl: pri; #1: leads GRN, BRN and BLK-YEL center tap pri; #2: leads YEL, RED and BLK center tap sec; #1: leads RED-YEL, RED-YEL and RED-BLK center tap sec; #2: leads BLU-YEL, BLU-YEL sec; #3: leads GRN-BLK, GRN-BLK
		BOARD, terminal:
TB1, 2	31B802699	14 solder lug term.
		SOCKET,
XE1	9A6776	vibrator; female; 7 cont.
		FUSEHOLDER,
XF1, 2	31K835455	dual fuse mounting
		LAMPHOLDER,
XDS1	9A813001	min; single cont; bay. base; incl. BLUE and RED coded, 4" long leads

REDUCTION OF INTERFERING NOISES IN MOBILE OPERATION

1. INTRODUCTION

Noise generated by the electrical system of the vehicle, as well as local ambient noise, may interfere with normal operation of two-way mobile radios. To overcome these interferences, various noise reduction procedures are required. These requirements vary from one vehicle to another, depending on the frequency of the system, the type of vehicle used, as well as the area the system is expected to cover. If the area to cover is sufficiently small so that signal levels may always be high, less noise reduction is required. Conversely, for maximum range coverage and operation into weak signal areas, noise reduction becomes very important.

Before attempting any noise reduction procedures determine the noise source, then, follow a systematic method of elimination until the interference is removed, or appreciably reduced.

2. NOISE REDUCTION KIT

The Model T LN6252A Noise Reduction Kit is available for all vehicles equipped with two-way radios. This kit is supplied with all Motorola 25-54 mc radio sets because the noise problem is more severe on the 25-54 mc band than it is on other higher frequencies. However, this kit may be obtained as an accessory item for other radio sets if desired. Refer to figure 4 for a typical noise reduction installation.

Noise reduction techniques for unusual or acute cases are outlined in paragraph 9 of this section.

3. GENERAL INFORMATION

Split-channel commercial two-way equipment will communicate as far as wide band equipment under no-noise conditions, but it is more susceptible to impulse noise interference. Impulse noise is most noticeable in installations of narrow bandwidth receivers because of the steep sided selectivity characteristics and not because of the method of obtaining the selectivity.

The useful range of split-channel two-way radio communications equipment can be seriously affected by noise interference, which prevents the reception of a clear easily understandable signal. A certain amount of noise interference may be tolerated when operating in a strong signal area or when operating a short distance from the station. However, in weak signal areas such as fringe area operation, serious noise interference can cause a complete failure in the reception of the station signal.

However, for more efficient use of the frequency spectrum, it is necessary to reduce receiver acceptance bandwidths. As these acceptance bandwidths become smaller the noise problems become greater.

4. NOISE SOURCE

The source of noise can generally be determined by its sound in the speaker. For best results in locating noise, the unit should be receiving a weak signal which produces not less than 10 db nor more than 30 db noise quieting.

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a. Impulse noise interference generated by the vehicle electrical system. This type of interference is generated by the commutator action, vibration of electrical contacts and electrical arcing or sparking. This broad-band interference may be propagated via space radiation.

The impulse noise enters the receiver through the antenna and serious interference in the form of tuned circuit "ringing" results even though the impulse may be very brief. "Ringing" may be defined as the shock excitation of a tuned circuit caused by an impulse which extends the duration of the impulse. It is this "ringing", caused by the impulse rather than the impulse itself, which is objectionable.

b. Noise produced by flourescent lights, electric motors, electric fences, induction from power lines and similar sources is generally AM in nature, excluding capture effect. Normally, all such noise is removed from a received carrier by effective limiting action. Also, a vehicular radio is able to move out of a high noise level area if this type of noise interferes with reception. Thus, such conditions may be tolerated.

NOTE

Thermal agitation noise and tube noise produced in the receiver, as well as ripple in the power supply, have been taken into consideration in the original design of the equipment. Any well designed mobile radio unit will not present any serious problems in this respect.

5. IGNITION NOISE

An automobile electrical system provides the primary source of electrical interference to radio communications in mobile installations. Electrical interference can be generated in the spark plugs, distributor contacts, generator armature, voltage regulator, electrical gauges, wheel static and any part of the car where friction may exist due to intermittent contact between any two members of the car's mechanical structure.

In a mobile installation, the prime source of electrical interference with radio communications is in most cases the result of a spark discharge or arc created in the electrical system. Whenever a spark discharge takes place through air, high frequency oscillations are generated in a range of frequencies from a few kilocycles to hundreds of megacycles. These oscillations are generally radiated, however, they may be picked up by associated wiring and transferred to other electrical wiring in the system including that of the radio installation.

The problem of suppressing all the arcing that can develop in the electrical system may be difficult. For example, in an 8 cylinder engine operated at 2000 RPM, arcing in the engine system can be at the rate of 8,000 sparks per minute or 133 per second. These arcs after being extended because of ringing, can create a blanket of noise blocking out weak signals at the radio receiver and only the very strongest are able to overcome such an obstacle.

6. THE IGNITION SYSTEM

In order to effectively reduce ignition interference in a car, it is well to understand the operation of an automobile ignition system.

Ignition is necessary in a gasoline engine to ignite the gasoline vapor and the air mixture in its cylinders. The system is made up of the battery, distributor, breaker points, coil, condenser and spark plugs. The 6 or 12 volt battery is the only electrical source of power in an automobile. Therefore, its low voltage must be stepped up to the high voltage necessary to develop an arc across the electrode of the spark plugs. This arc ignites the gas mixture.

The electrical circuit arrangement is accomplished by a mechanical circuit breaker (points in the distributor) which opens the primary circuit of the ignition coil. By transformer action in the coil, high voltage is developed at the coil secondary. This high voltage is applied and synchronized to each spark plug by means of the distributor.

The battery is connected to the primary winding of the coil through the ignition switch. The primary circuit is completed back to the battery through the breaker points, which are bypassed by the condenser. The points are normally closed. As the cam shaft is rotated by the engine, its lobes or corners open and close the points in proper synchronization with each cylinder.

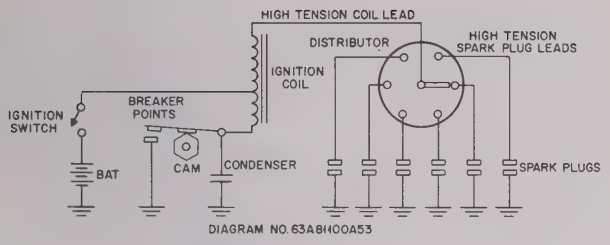

Figure 1. Ignition Circuit

With the ignition switch on and the breaker points closed, the primary current in the coil cannot build up rapidly, due to the self-inductance of the primary coil.

When the breaker points open, the primary current decreases almost instantly and an EMF is produced in the primary by self-induction, which is many times greater than the battery voltage. Also, when the breaker points open, the condenser reduces arcing of the points. Because of the stepped up ratio, the high voltage induced in the coil secondary causes a spark across the spark plug gap for a short interval of time.

The secondary circuit of the ignition coil, with the spark gap, is much like a spark transmitter used in the early days of radio. It is the heart of the ignition interference. All that is needed is an inductance and capacity in series with the spark gap. The lead inductance and stray capacity provides this tuned circuit. Because the discharge of the circuit is through a low resistance (ionized spark gap), the circuit tends to oscillate. The frequency of oscillation and the amplitude that is developed varies as the current changes in the spark gap. This oscillation in the high tension leads develops r-f currents which can interfere with the radio reception.

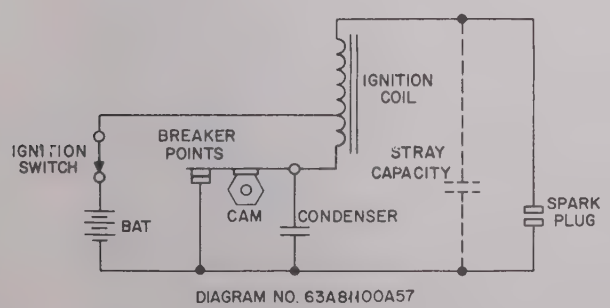

Figure 2. Simplified Ignition Circuit

7. NOISE REDUCTION TECHNIQUE

It has long been known by ignition engineers that the addition of a series resistance adjacent to a spark discharge will serve to dampen out the troublesome oscillation which causes interference. The types of spark plug suppression consistent with good engine performance to be applied in noise reduction should always be in accordance with the recommendations of the car manufacturer, i.e., if spark plugs are to be replaced with built-in suppressor types, they should be in the proper heat ranges and thread sizes for the particular engine. If resistance wire is used, the length may be critical so as not to exceed the total permissible resistance to be added. In addition to spark plug suppressors or resistance wire, an economical basic kit of noise reduction items can consist of the following: special coaxial capacitors, combinations of resistor and capacitor assemblies and hood wiper springs.

NOTE

In all cases where coaxial capacitors are mentioned, they should not be replaced by standard by-pass capacitors. The standard by-pass displays a resonance effect with high attenuation, at about 2 megacycles. The coaxial type is non-inductive and has high attenuation, up into the uhf region.

The importance of such noise reduction items is greatly increased by their application at the right terminal points in the cars electrical system. Following is an outline of the important points to be considered and a step by step procedure in ignition noise reduction.

NOTE

Noise reduction can only be achieved if components are properly grounded. BE SURE THAT ALL CAPACITORS AND THE GENERATOR FIELD SUPPRESSOR ASSEMBLY ARE PROPERLY GROUNDED.

In the development of a noise reduction kit, it was not necessary to include a resistance cable in the wiring harness. One or the other of such items is generally found as a standard part of present day motor vehicles. However, the absence of such items from a basic noise kit is not to be misconstrued as being non-essential to noise reduction. Spark plug noise reduction is one of the most essential points to be covered in all cases.

a. Generator Interference

The generator is a source of electrical interference which is frequently blamed on the

ignition system. Electrical current passing between the brushes and commutator in the generator creates many small arcs as the armature rotates. Generator noise is characterized by a high pitched "whine" and varies with engine speed. A .5 uf coaxial capacitor should be placed in series with the generator armature to reduce interference.

NOTE

If the vehicle is supplied with an alternator, the capacitor is not necessary.

b. Voltage Regulator Interference

The modern voltage regulator is a precise mechanism containing three separate control systems operating with breaker contacts. Vibrating breaker contacts cause arcing which may result in annoying interference. This interference is usually noted in the form of erratic popping in the receiver which changes only slightly in frequency with increase in engine speed.

To reduce voltage regulator hash noise, two .5 uf coaxial capacitors and a resistor-capacitor assembly are used (see figure 4).

CAUTION

Disconnect the ground battery terminal from the battery before attempting to add any components to the battery terminal of the voltage regulator.

c. Ignition Coil Interference

A .1 uf coaxial capacitor should be placed at the BAT side of the ignition coil to eliminate impulses from the low voltage leads (refer to figure 4).

d. Distributor Interference

Sparking in the distributor itself is a source of radio interference. As the rotor rotates in the cap, sparking occurs between the rotor and the distributor cap inserts. To reduce the interference, a length of radio ignition wire connecting the ignition coil to the distributor cap has proven most effective.

NOTE

Some vehicles are equipped with radio ignition wire. Disregard replacement instructions in these instances.

e. Battery Connection

Connecting the radios primary power lead directly to the battery instead of the starter relay can help to keep noise off the "A" lead. The battery acts as a large capacitor (about 1 farad for 50 amp capacity batteries) by-passing noise to ground. This large capacitor serves as a very effective by-pass. The battery ground return should also be bonded to the frame. Utilizing the car frame as a common ground as much as practical, tends to minimize the possibility of inducing undesirable parallel ground currents.

f. Hood Wipers

Ground returns for the electrical circuits are provided through the body and frame of the automobile. Differences in conductivity, inadequate bonds between adjacent conductors and unequal current distributions result in potential differences throughout the vehicle. The miniature arcs created by these potential differences can be avoided by eliminating the potential differences. Effective use of copper bonding braid and brass contact wipers as hood bonds will minimize interference from this source.

8. NOISE BALANCING IN RECEIVERS

Noise balancing a receiver may result in an appreciable amount of noise reduction. However, this method alone may not reduce all the apparent ignition noise.

It is characteristic of an FM receiver, that, at one point in the alignment, a null point in impulse noise response will be reached. This null may vary from installation to installation. As the unit leaves the factory, the receiver is tuned to the exact operating frequency and is adjusted for proper noise balance. However, if it is found necessary to noise balance the receiver at some future date (as the set ages) or in some specific installation, the following procedure should be used:

Adjustment should be made with the receiver installed in the vehicle and the engine running.

a. Turn the equipment "on" and allow it to warm-up for at least five minutes.

b. Turn up the volume to a normal listening level.

c. Radiate a signal on the frequency of the receiver. The signal can originate from a Motorola portable test set with a built-in crystal controlled peaking generator and correct channel crystal, from a signal generator, or from a distant transmitter.

The receiver should be on frequency. The receiver signal should be just strong enough to produce 10 to 30 db quieting.

d. Start the vehicle and let the engine idle.

e. Connect the portable test set to the receiver metering receptacle.

f. Place the selector switch of the test set in position 2.

g. If adjustment of the second mixer coil does not prove effective, adjust any one of the first i-f coils until ignition noise is substantially reduced. The first i-f coils are very sensitive and may only be adjusted a very slight amount without reducing receiver gain. When making ignition noise balance adjustments, do not decrease the meter reading more than one-half microampere.

h. If satisfactory reduction of audible noise cannot be obtained by the methods previously described, the secondary winding of the discriminator is probably not aligned to exactly 455 kc. Align the discriminator as described in the receiver alignment procedures of the instruction manual.

9. ADDITIONAL NOISE REDUCTION TECHNIQUES

In some radio installations it may be necessary to obtain maximum noise reduction. In such installations the following possible source of noise interference should be explored and remedy applied.

a. Ammeter to battery lead. (By-pass with .5 uf capacitor. Motorola part #8A821889).

b. Gauges, oil signal, gasoline and temperature. (By-pass with .5 uf capacitor. Motorola part #8A821889).

c. Ignition switch. (By-pass with .5 uf capacitor. Motorola part #8A821889).

d. Headlight, tail light or dome light leads. (By-pass with .5 uf capacitor. Motorola part #8A821889).

e. Accessory wiring, electrical windshield wipers, heater motor, window openers and others. (By-pass with .5 uf capacitors. Motorola part #8A821889).

f. Wheel static. (Use wheel static collector rings on both front wheels. Motorola part numbers 1K534254 Regular Type: 1K563173 Small Type.)

g. Acute cases of generator noise. (A generator filter such as the Motorola type P-346, rated at 40 amperes, is most effective.)

h. For severe cases of ignition interference, Hallett Ignition Shielding Kits, shown in figure 3, are available through Motorola on separate order. These special shielded harnesses are available for most automobile and truck engines, providing improved communication in fringe areas and essentially waterproofing the ignition system. Supply the following information when ordering Hallett Ignition Shielding Kits.

1. Make and year of vehicle
2. Auto or truck and number of cylinders
3. Engine cubic inch displacement
4. Type of ignition system; Auto-Lite, Chrysler, etc.

NOTE

Fire truck engine shielding requires more detailed information to assist in supplying the proper kit. Write first for the special "fire truck shielding form" from your nearest Motorola Parts Depot.

i. A generator-regulator shield is available to further reduce generator and regulator noise. It is not required on alternator equipped vehicles. Follow the same ordering procedure when requesting this item.

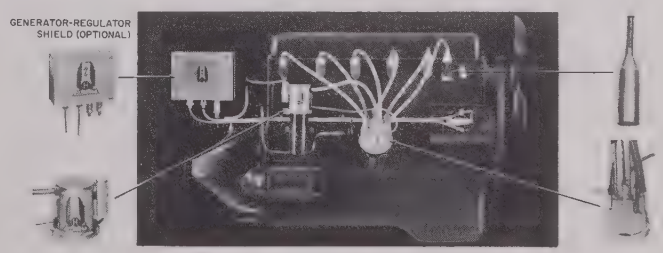

Figure 3.

10. CONCLUSION

The level to which ignition noise interference will need to be reduced will depend on the environmental conditions of operation of the radio system. The factors involved are the strength of the received carrier at various points within range of the fixed station, and the clarity of signals at the fringe areas. However, in most cases ignition noise interference can be substantially reduced resulting in optimum performance of the radio equipment under most operating conditions.

The reduction of ignition noise interference, in many cases, is essential to good system performance. Therefore, it must be given full consideration in the initial installation of the radio equipment. The components required to successfully reduce ignition noise interference may well prove to be an essential part of the communications system. Indeed, no installation of mobile radio can be complete unless the remedy for bothersome ignition noise interference has been successfully applied at the time of installation.

Specific noise sources may be isolated to some extent, under specific conditions. When the vehicle is standing still with the ignition switch off, any noise heard will probably be external to the vehicle. Static discharge noise will be added when the vehicle is moving with the ignition switch off. If the vehicle is coasting in gear, with the ignition switch off, generator noise will be added to the others, if present. Noise produced by inadequate bonding will be most noticeable when maximum current is being drawn from the battery, and may be increased when the vehicle is in motion. Care should be used to be sure that noise tests are made both with and without weak signals. Also, care should be used to check with squelch control in the unsquelched or maximum sensitivity condition.

The use of a coaxial flexible lead, with a probe pick up loop about one inch in diameter, connected to a separate powered radio set or oscilloscope and used as a search wand to find the hottest areas, has been found to be most useful.

It is impossible to give an exact procedure to counteract noise in all cases; too many variables exist. With an understanding of some of the sources of noise, an intelligent approach will often save considerable time. Ignition noise reduction can add to both operational efficiency and operator satisfaction.

NOISE IDENTIFICATION AND REDUCTION CHART

Characteristics of Noise at Speaker	Source of Noise	How to Check Source of Noise	How to Reduce Noise
Identified as popping sound	Ignition	Noise varies in frequency with engine speed and will disappear when ignition is switched off.	1. Check to be sure: (a) Distributor breaker points are in good condition. (b) Ignition capacitor is in good condition. (c) All ignition system connections are free of corrosion & making good contact. (d) There is d-c continuity in high voltage leads. (e) There are sufficient high spark plug break-down voltages. (f) Spark plug electrodes are properly spaced and in good condition. 2. Bond each corner of the motor block to chassis ground using a heavy copper grounding braid. 3. Damp the high voltage by installing a resistor suppressor in the distributor rotor lead, or suppressors in the ignition cables or on top of the spark plugs. 4. Install resistor spark plugs or resistance ignition cables.
Identified as a high pitched whine	Generator	Noise varies with engine speed and will persist if ignition is switched off while engine is running at a moderate speed.	Install a .5 uf coaxial capacitor at the generator in series with the armature lead.

NOISE IDENTIFICATION AND REDUCTION CHART (Cont'd)

Characteristics of Noise at Speaker	Source of Noise	How to Check Source of Noise	How to Reduce Noise
Identified as raspy sound	Voltage Regulator	Look for arcing voltage regulator contacts.	Install .5 uf coaxial capacitors, Motorola Part Number 8A821889 at the battery (BAT.) terminal in series with the battery lead and at the generator (ARM) terminal in series with the armature lead. Install RC Filter (1V80700A89) composed of a 3.3 ohm resistor in series with a .002 uf capacitor (Maximum allowable capacity) in series with the field (F) terminal of the voltage regulator to a common ground.
Identified as a hissing or crackling sound	Gauges	Noise may be detected by jarring the individual gauges while the ignition is on.	Install .5 uf by-pass capacitors where needed. (Motorola part #8A821889)
Identified as a low-pitch clicking sound	Oil Sender	Noise rate varies with oil pressure and stabilizes at point of maximum oil pressure.	Install .5 uf by-pass capacitor (Motorola Part Number 8A821889) from gauge lead terminal on Oil Sender to chassis ground.
Identified as an irregular popping sound	Wheel Static	Noise disappears when brakes are lightly applied.	Install suitable grounding brushes or springs such as front wheel static eliminators (Motorola Part Number 1K534254 regular type, 1K563174 small type).
Identified as a more regular or sharper popping sound	Tire Static	Noise becomes much worse at 30-50 mph.	Use anti-static powder in tires with inner tube.

11. KIT COMPLEMENT

Reference Number	Quantity	Motorola Part Number	Description
1	3	1V839913	Lead & Lug Assembly
2	1	1V80700A88	Lead & Lug Assembly
3	1	8C82571B02	Capacitor, Coaxial (.1 uf - 100 V)
4	3	8C82571B01	Capacitor, Coaxial (.5 uf - 100 V)
5	1	1V80700A89	Generator Field Suppressor Assembly
6	1	30A502396	Ignition Coil Suppressor Cable
7		1V80700A91	Hood Wipers and Mounting Kit Hardware

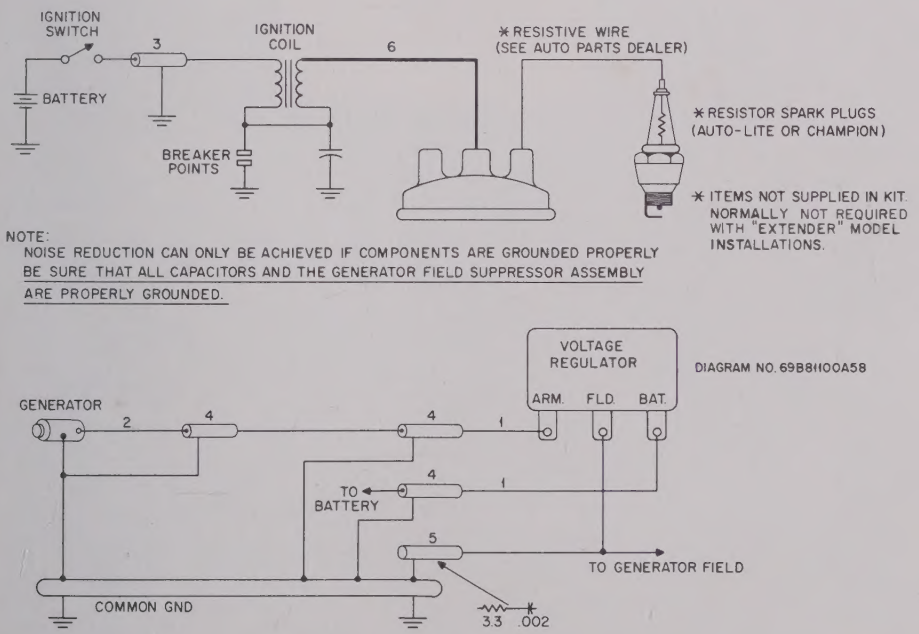

Figure 4.
Typical Noise Reduction Detail

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